WATTLE RESEARCH INSTITUTE
12 APR 1956
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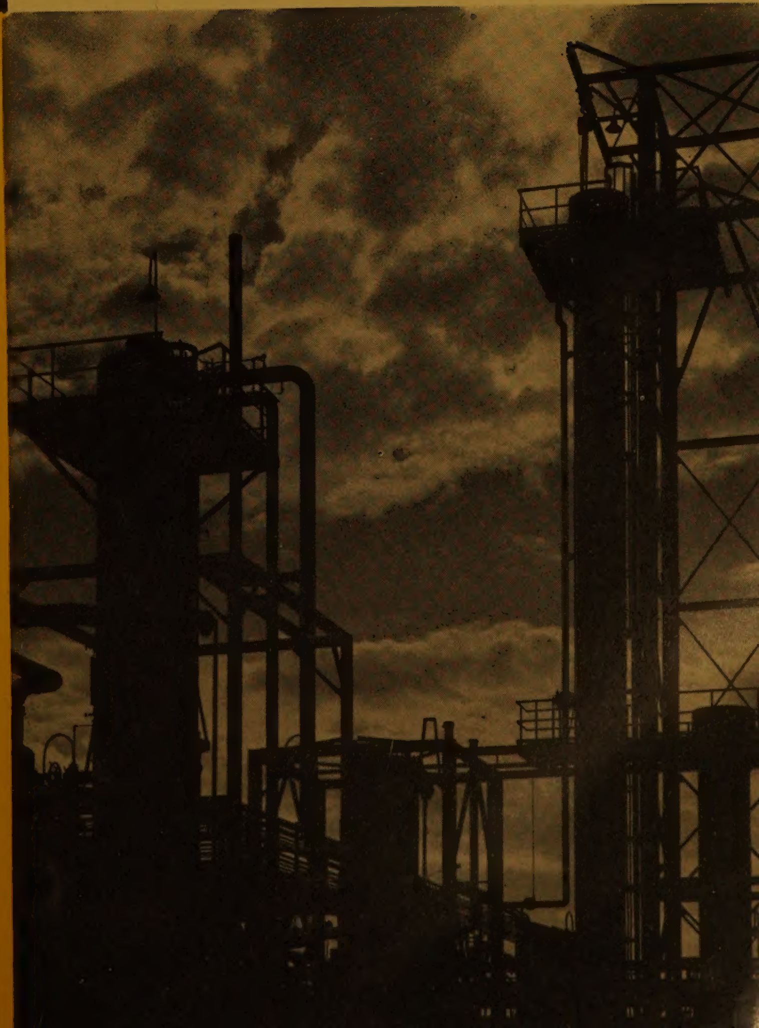
AGRICULTURAL *Chemicals*

In this issue

- Grasshopper Control
- Fertilizer Granulation
- New Costa Rica Plant
- Fungicide Requirements
- Nemagon, Soil Fumigant
- Nitrogen Solutions
- Dedicate Pensicola Plant
- Garden Supply Show
- Illinois Spray School

March, 1956



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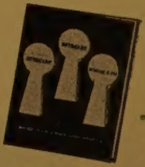

AGRICULTURAL *Chemicals*

Units for purification of gases in making anhydrous ammonia at the new Pensacola plant of Escambia Bay Chemical Corp., in Pensacola, Fla. This is the first ammonia plant in the United States to use potassium carbonate absorption for removing carbon dioxide. See story on page 40.

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Vol. 11, No. 3 **March, 1956**

AGRICULTURAL *Chemicals*

ARTICLES

EDITORIALS 31
GRASSHOPPER CONTROL 32
By James R. Dutton
PILOT PLANT STUDIES OF GRANULATION OF HIGH-ANALYSIS FERTILIZERS 34
By T. P. Hignett
NAC HOLDS SPRING MEETING IN HOLLYWOOD, FLA. 37
QUIMAGRA AGRICOLES' COSTA RICA PLANT IN PRODUCTION 38
ESCAMBIA BAY CHEMICAL DEDICATES NEW PLANT IN PENSACOLA........ 40
INDUSTRY'S PART IN MEETING OUR FUNGICIDE REQUIREMENTS 42
By Gordon A. Brandes
A REPORT ON NEMAGON SOIL FUMIGANT 46
By C. C. Compton and S. H. Benedict
NITROGEN SOLUTIONS 51
By Howard Lathrope
INSECT CONTROL CONFERENCE, INDUSTRY CONFERENCES IN OREGON 88
By Charles Starker
GARDEN SUPPLY SHOW HELD IN CHICAGO AND NEW YORK 93
CUSTOM SPRAY OPERATORS DISCUSS GRANULAR INSECTICIDES 91

FEATURES

IN THE SPOTLIGHT THIS MONTH 9
THE LISTENING POST 53
By Kelvin Dorward and Paul Miller
FERTILIZER VIEWS AND NEWS 56
By Vincent Sauchelli
TECHNICAL SECTION 61
WASHINGTON REPORT 69
By Donald Lerch
INDUSTRY NEWS 97
SUPPLIERS' BULLETINS 119
PROFESSIONAL DIRECTORY 145
CLASSIFIED ADVERTISING 147
INDUSTRY MEETING CALENDAR 148
ADVERTISERS' INDEX 149
TALE ENDS 150

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Fertilizer Grows Farm Profits

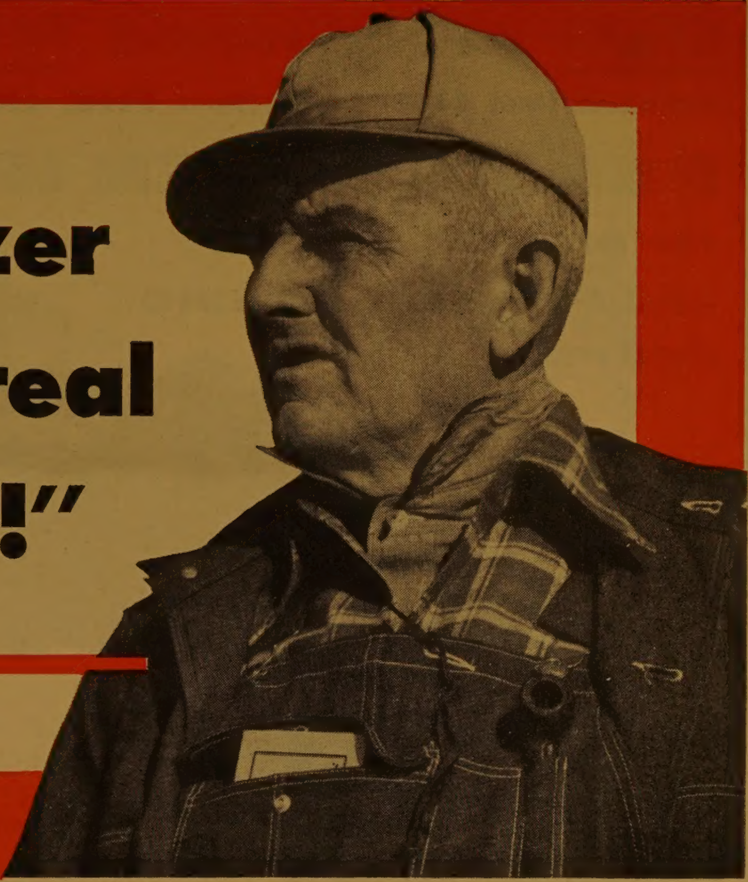
Fertilizer is vitally important to the farmer who is faced with acreage restrictions and lower prices for crops he sells and higher costs for things he buys.

Fertilizer produces big extra yields from fewer acres, thus assuring a greater return from land, labor, machinery and other fixed expenses.

The importance of fertilizer to the farmer is being brought to the attention of 3½ MILLION readers of farm magazines in a powerful and continuing campaign conducted by Nitrogen Division, Allied Chemical & Dye Corporation.

The advertisement on the opposite page is one in a series of big, full-page, two-color ads. More will follow. We trust that this campaign is helpful to you and we will greatly appreciate any comments or suggestions you may wish to send us.

"Fertilizer is a real friend!"



"I've been farming a long time. I've built up my business with more land, more machinery and more fertilizer, along with a lot of work. I've sold corn and fed corn, and burned it in the stove. I've got a cribful sealed up now. I've seen $26 hogs and $34 cattle, as well as present prices. In all this time, I figure I've worked my way out of every squeeze that came along. When I get pinched, I bring down my costs a little more. Right now fertilizer helps me cut costs better than anything else.

"Tractors, machinery and fertilizer kept me in business when my son and the hired man went in the army. More land and more fertilizer kept us going when the boy came back—with another family to feed. I figured it was easier to make money on a big farm with enough plant food in the soil to give crops the gumption to grow.

"I don't grow more than 40 acres of corn now. We used to grow 100. But we get as much feed off the 40 as we did off the 100. And every bushel of corn and every ton of silage costs us less. We use plenty of fertilizer to get 90 to 110 bushels of corn to the acre. We used to get 40 to 50. Hired hands are expensive, land and taxes keep going up. But fertilizer is still about as low in price as it was 10 or 20 years back.

"With lots of fertilizer I can grow corn for less than 60 cents a bushel. It used to cost me $1 a bushel when I used less fertilizer. I can stay in business today growing 60-cent corn. With fertilizer, I can even show a profit on my oats. I get 4 tons of hay to the acre now instead of 1½. I've doubled the pounds of beef I get off of pasture. Fertilizer is a real friend—it has been the biggest single help I've had to keep making money from farming.

"Spring won't wait for 1956 farm programs to get ironed out. If somebody can help jack up the price of crops, fine! But I'm going to make sure I grow my crops as cheap as I can with the help of plenty of fertilizer! That's my farm program!"

Fertilizer grows farm profits! Fertilizer gives you more crops for your money, labor and time, on every acre you plant to cash crops, feed crops and cover crops. Fertilizer cuts costs per bushel or per ton of crop produced. Use more fertilizer to open up your margin of profit between costs and sales prices and you'll never be a marginal farmer!

See Your County Agent

Ask your County Agent to recommend the analyses and the amounts of fertilizers best suited to produce big yields of the crops you grow on your soil. His advice to you is based on the latest official recommendations from your Extension Service and Experiment Station.

See Your Banker

Bankers are alert to good investments. They know that fertilizer pays a big return in the short period of a growing season. If you need money to buy more fertilizer, most bankers consider the extra yields produced by fertilizer as an excellent risk.

See Your Dealer

Your fertilizer dealer can supply you with a good brand of fertilizer in the amounts and analyses as recommended by your County Agent. Help your dealer to get your fertilizer to you on time by placing your order early and accepting prompt delivery. Use more fertilizer per acre than ever before and have it on hand when you need it. Remember, fertilizer grows farm profits. Use enough to really pay you big!

The fertilizer industry serves the farmer. Nitrogen Division serves the fertilizer industry as America's leading supplier of nitrogen for use in mixed fertilizers.

NITROGEN DIVISION Allied Chemical & Dye Corporation
New York 6, N. Y. • Hopewell, Va. • Ironton, Ohio
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for BIGGER, BETTER and FASTER-GROWING CROPS

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PERMA GREEN IRON 135 is an organic chelate that moves upward with the sap to rejuvenate the entire plant.

PERMA GREEN IRON 135 *now produces* —

— more and juicier oranges and grapefruit
— more and larger nuts
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Write for detailed information on PERMA GREEN IRON 135 for plants and reprint of scientific article on CHELATES.

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UNTREATED

ORANGES

Four ounces to one pound PERMA GREEN IRON 135 per tree produces dark green leaves and more, larger and better colored oranges.

TREATED

SUNFLOWERS

Grown in nutrient solution. Small yellow plant at left treated with iron sulphate. Large dark green plant at right treated with PERMA GREEN IRON 135.

GARDENIAS (Greenhouse)

Iron is very important for gardenias. Treat each bush with 1/10 to 1/3 level tablespoonful PERMA GREEN IRON 135 to insure dark green leaves and large pure white flowers.

In the Spotlight this Month

● **At the Oregon Meetings** . . . Karathane effective in mite control on apples and pears; DDT fails to control coddling moth in Colorado, but Ryania shows promise against this pest . . . Page 88-90.

● Cabbage seedpod weevil may be showing resistance to certain organic phosphates . . . Page 88-90.

● **Grasshopper Control** . . . this used to be a separate operation in cotton because the insecticides used formerly did not kill the grasshopper. Now, cotton is sprayed for control of cotton insects with multiple applications of organic insecticides that also kill grasshoppers . . . Page 32.

● **How Much Nitrogen is Profitable?** . . . Dr. Sauchelli discusses practical questions on soil requirements, and the relation between nitrogen and cations . . . Page 56.

● **Granulation of High Analysis Fertilizers** . . . Granulation obtained with a given formulation may vary depending on such factors as design of ammoniator, heat losses from the ammoniator, effectiveness of temperature control in the ammoniator, physical properties of the superphosphate, and initial temperature of materials entering the ammoniator. "Self-granulating formulations" have been found to give best results . . . Page 34.

● **Giant Foxtail Control** . . . Most promising of newer chemicals being developed for pre emergence treatment of giant foxtail is Randox (CDAA) . . . Page 91.

● **"Bay-Sol and Ammo-Nite"** . . . Trade names of products to be made at the new anhydrous ammonia plant in Pensacola, Fla., dedicated last month by Escambia Bay Chemical Corp. . . . Page 40.

● **Tolerance Applications** . . . Nine firms file 15 more applications for tolerances for pesticides since Oct. 1, 1955 . . . Page 106.

● **Fungicide Requirements** . . . Recently discovered seed treatments have resulted in tremendous reductions in losses due to fungus. Industry's role in developing fungicides and meeting specific technical and legal requirements reviewed . . . Page 42.

Puzzled?

You may be puzzled about what the stock market will do . . . but there can be no question about what magazine to read.

Agricultural Chemicals offers you some 60 editorial pages each month, devoted to the technical and practical developments of the agricultural chemicals industry . . . a balanced distribution of articles and news of interest to the manufacturer and distributor of insecticides, fertilizers, herbicides, etc.

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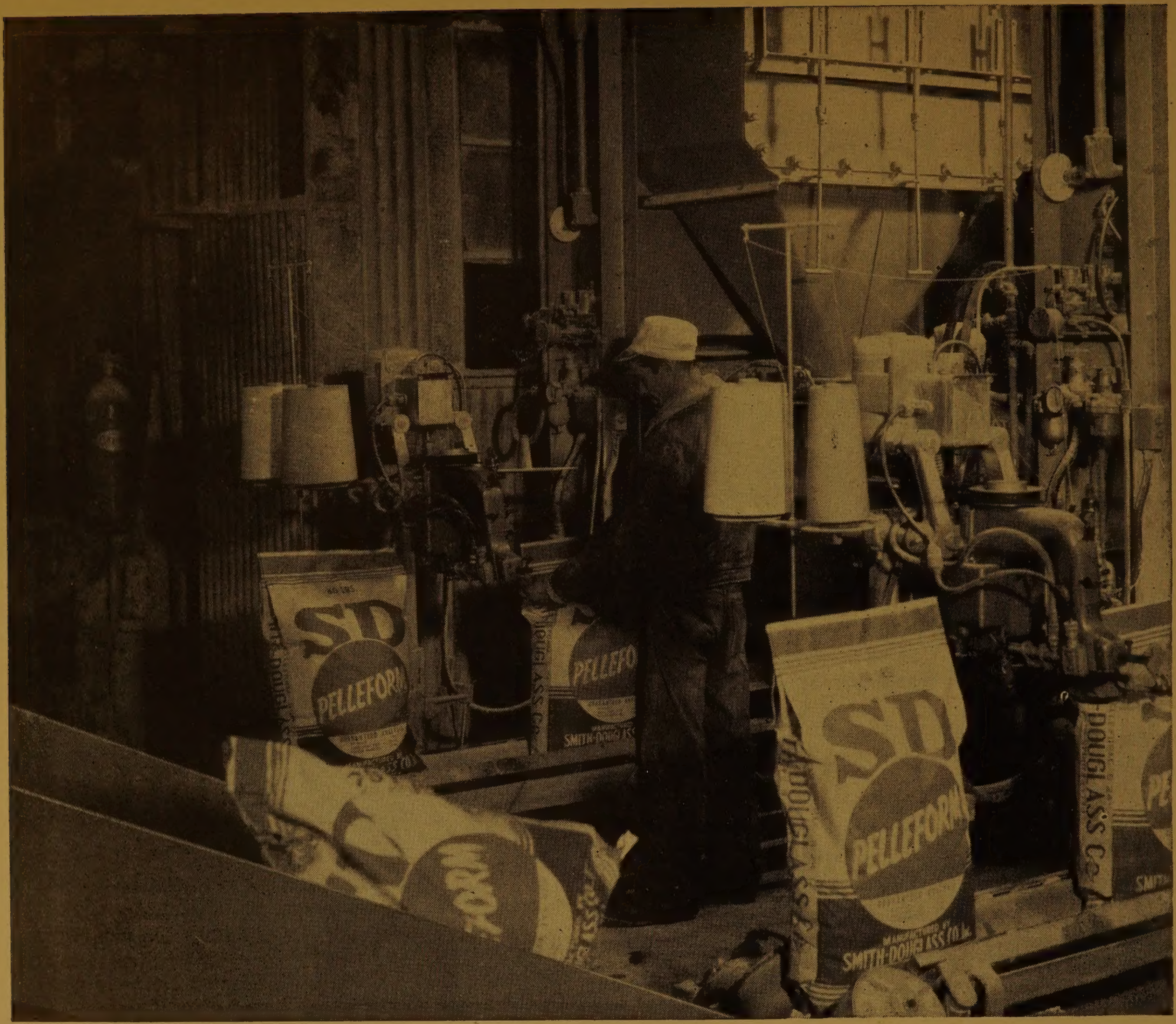
●

AGRICULTURAL CHEMICALS

P. O. BOX 31

CALDWELL, NEW JERSEY



The new Bemis Fertilizer Packer gives you a money-saving combination of speed and accuracy never available before

Smith-Douglass Selects New Packer

This photograph shows the New Bemis Fertilizer Packer in operation in the big Smith-Douglass plant in Streator, Illinois. Smith-Douglass' Plant Superintendent says, "After a thorough test, we find that the Bemis Fertilizer Packer is setting a new record for accuracy. We like it and our men like it."

The fertilizer you save through accurate weights and the labor you save through speed and a smaller crew will soon pay for your new Bemis Fertilizer Packer.

In actual plant operation the Bemis Packer is filling and closing sixteen to eighteen 80-lb. bags per minute . . . and holding to a weight tolerance of plus or minus 4-oz.

A major reason for this exceptional performance is the Bemis-originated 3-bucket design, which gives more time to fill each scale accurately.

Other features . . .

☆ The Bemis-designed automatic sewing machine actuator and cutoff.

☆ The Vee-Trof conveyor, which holds the bags upright without rails...no wrestling with filled bags. Your plant employees will think it's wonderful.

☆ A choice of automatic or manual discharge.

☆ A maximum of two men per unit is needed to operate.

☆ Size range—50, 80, 100 lb. multiwall bags; 100, 200 lb. textile bags.

This is the biggest advance in fertilizer packing in many years.

Get the complete story from your Bemis Man promptly.

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Check this chart and see for yourself why Kraft Bag Corporation should be your supplier!

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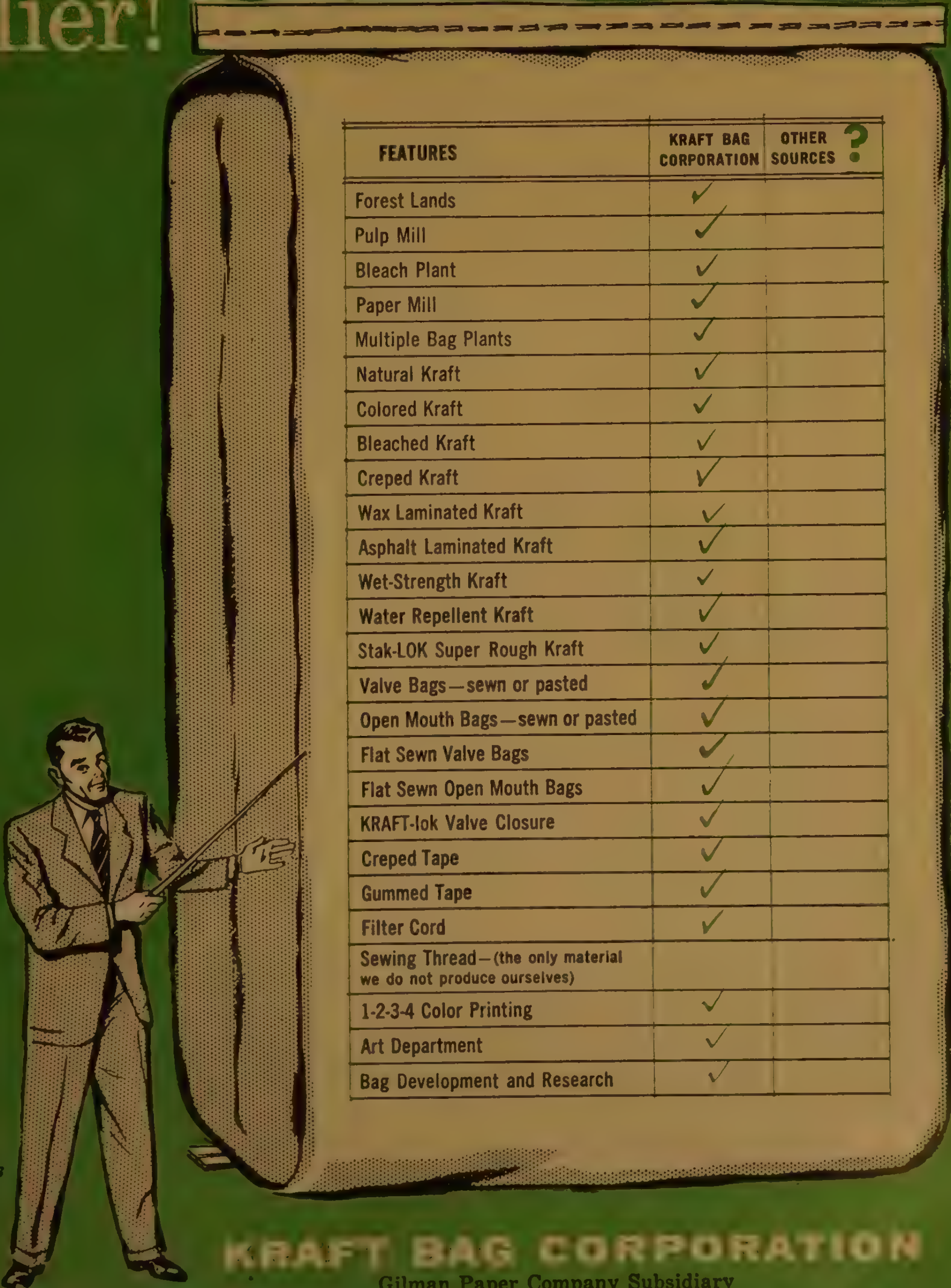

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Pulp Mill	✓	
Bleach Plant	✓	
Paper Mill	✓	
Multiple Bag Plants	✓	
Natural Kraft	✓	
Colored Kraft	✓	
Bleached Kraft	✓	
Creped Kraft	✓	
Wax Laminated Kraft	✓	
Asphalt Laminated Kraft	✓	
Wet-Strength Kraft	✓	
Water Repellent Kraft	✓	
Stak-LOK Super Rough Kraft	✓	
Valve Bags—sewn or pasted	✓	
Open Mouth Bags—sewn or pasted	✓	
Flat Sewn Valve Bags	✓	
Flat Sewn Open Mouth Bags	✓	
KRAFT-lok Valve Closure	✓	
Creped Tape	✓	
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Lion Nitrogen Fertilizer Solutions—Various types to suit your particular manufacturing needs.

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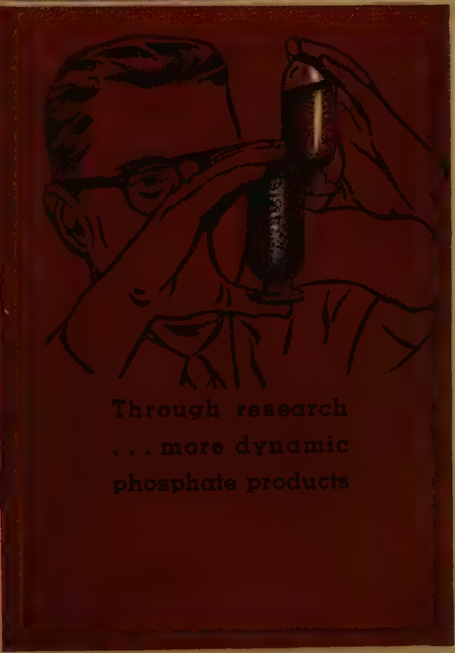
International Minerals Chemicals

Bonnie giant with a fine-textured touch



Through research
. . . more dynamic
phosphate products

Result:

better granulation with
International's new

TRIPLE Superphosphate

This giant International plant at Bonnie, Fla., adds the touch of fine texture to International's Triple Superphosphate — controlled uniformity of particle size, even density and low-moisture. These improved physical properties reduce your formulation costs. Promote better granulation. Give the same excellent ammoniation in batch after batch.

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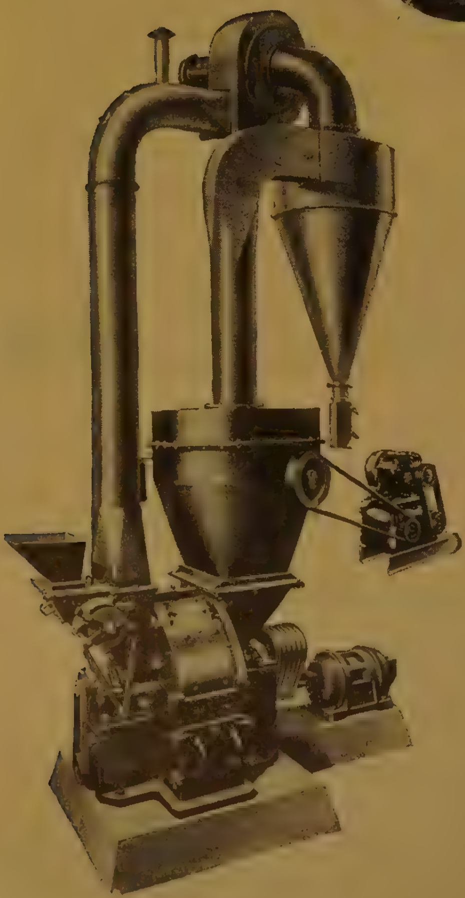
Producing Field Strength Insecticides



. . . is a Clean Dustless Operation with the Raymond IMP MILL

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It handles the material automatically in an enclosed system that eliminates dust or waste. It provides close control over the finished product by means of simple adjustments while the mill is running.

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Whizzer Separation is a feature of the Raymond Imp Mill that insures uniform quality products, maximum capacities and low cost operation.

For Further details of Raymond insecticide grinding mills, write for Bulletin No. 68

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NOW PRODUCING A CONTINUOUS SUPPLY OF ANHYDROUS AMMONIA, NITRIC ACID, BAY-SOL NITROGEN SOLUTIONS, AND—

AMMO-NITE

AMMONIUM NITRATE FERTILIZER

Containing 33.5% Nitrogen

AMMO-NITE NITRATE
GROW IT RIGHT with
AMMO-NITE
AMMONIUM NITRATE FERTILIZER
Containing 90% or more Ammonium Nitrate with no Organic Coating
33.5% NITROGEN
NET WEIGHT 100 POUNDS
MANUFACTURED BY ESCAMBIA BAY CHEMICAL CORP. PENSACOLA, FLORIDA
DISTRIBUTED BY ASHCRAFT-WILKINSON CO. ATLANTA GEORGIA
AMMO-NITE

Sell AMMO-NITE . . . and you can offer your customers *more* Nitrogen for *less* money than other plant food forms. Simple arithmetic proves it! More Nitrogen in every bag means less bulk and weight for you and your customers. Uniform AMMO-NITE prills flow freely, spread evenly — never clog or stick in the spreader. AMMO-NITE leaches far less, too! New *stay-dry* bags keep AMMO-NITE in perfect condition in any weather. Order now. *It's a money-maker!*

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AMMO-NITE!

Products of the Escambia Bay Chemical Corporation, Pensacola, Florida, are distributed exclusively by

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Dusts, liqui-dusts or sprays concentrates from either or both sides.

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Compact, low design allows easy access to close growing tree rows.

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Niagara CHEMICAL DIVISION
Food Machinery and Chemical Corporation

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fmc
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Niagara Series 60 Liqui-Duster.
A larger companion machine for the big acreage grower.

SOHIO

on stream!

Sohio Chemical Company now shipping high-quality nitrogen products

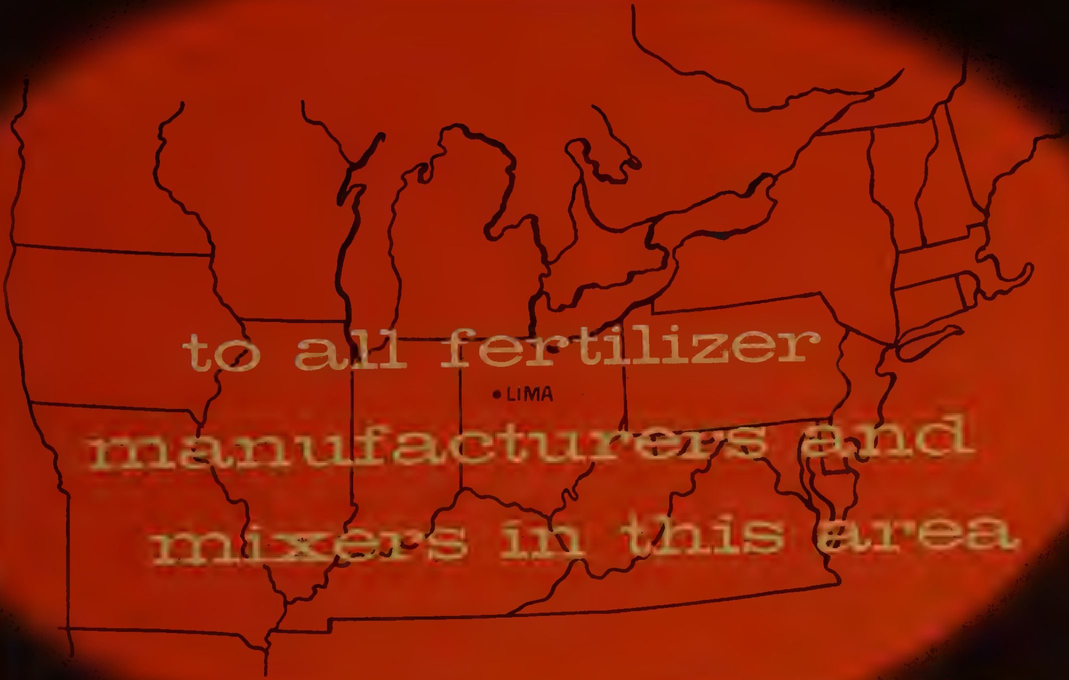
See the following five pages for the picture story of the fertilizer industry's most modern source for ammoniating solutions, urea and ammonia.

Ample anhydrous ammonia storage more than assures deliveries during peak demand periods.

Largest storage facilities in country in relation to production capacity.

DRAWING on the best available experience in the chemical industry, Sohio surveyed every known method of ammonia and urea production. Selecting the most reliable of processes to produce the highest quality product, the ultimate in a modern petrochemical plant was designed. No effort, no expense was spared. Users of nitrogen chemicals were questioned as to their product and delivery needs. Research and production departments were staffed with outstanding men. The new Sohio Chemical plant at Lima is as perfect as men and materials can make it.

AN INVITATION



to all fertilizer manufacturers and mixers in this area

to utilize the complete facilities and superior service of Sohio's new plant at Lima, Ohio

To bring this new plant into full production at this early date we worked 'round the clock . . . accomplished in weeks what normally requires months.

WE WANT TO BE INCLUDED IN YOUR 1956 PLANS! Here's your opportunity to acquire an efficient, dependable source for the finest nitrogen products:

● **ANHYDROUS AMMONIA**
● **AQUA AMMONIA** ● **NITROGEN SOLUTIONS**
● **AMMONIATING SOLUTIONS** ● **UREA**

fast service

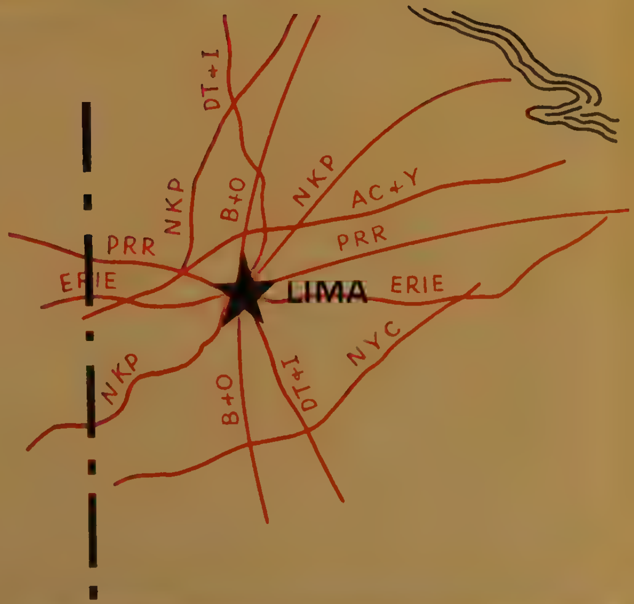
unmatche facilities

uniform high quality

Centrally located in America's agricultural heartland, Sohio's Lima plant is served by five railroads:

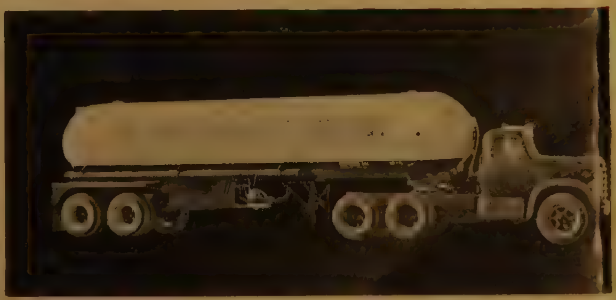
NICKEL PLATE **BALTIMORE & OHIO** **ERIE**
PENNSYLVANIA **DETROIT, TOLEDO & IRONTON**

These lines offer ready transfer to connecting roads. In addition, two of them provide switching service inside the plant area, assuring rapid rail service from Sohio's plant.



- Equipment and methods are the most modern among the thoroughly tested and proven processes.
- There is adequate provision for expansion.
- Uninterrupted operation is assured by multiple sources for natural gas, water, electrical power.
- Downtime is minimized because of Sohio's integrated maintenance system.

One of the most important requisites for a plant in this market is its ability to meet extraordinary delivery requirements. Sohio's shipping and storage facilities are geared to these needs. For example, rail car loading capacity is *four* times productive capacity. In addition, Sohio's own trucks are ready to ship on relatively short notice. And no other producer offers a more complete line of ammoniation products.



New aluminum 5200-gallon solutions and 6800-gallon steel anhydrous ammonia tank trucks furnish regular delivery service withi normal trucking area and twenty-four hour emergency servic throughout distribution area. Excellent road facilities to all points

Electronic Quality Control

pays dividends to Sohio customers

New electronic methods — unique systems never before used in this industry — maintain quality and production control at Sohio Chemical Company. Every phase of ammonia production is electronically scanned five times each minute and recorded by the Data Logger, an instrument originally perfected for the Atomic Energy Commission. Production and quality conditions are recapped hourly by the Data Logger and transmitted to IBM cards for continuing analysis by an "electronic brain." This assures uninterrupted quality production. Pictured here are other quality checks that continuously safeguard quality.

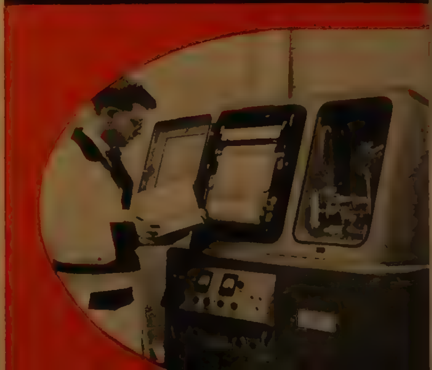
Sohio's all-new fleet of aluminum solutions tank cars and high pressure steel anhydrous ammonia tank cars are ready to serve you. These cars and the tank trucks are equipped with the most modern devices including spring-loaded relief valves to meet your requirements for safer, quicker, more economical service.

Infra-red Spectrophotometer analyzes the various process gas streams.

Kjeldahl rack used in determining nitrogen content of materials to make quantitative analysis.

Standardizing titration solutions for finished product analysis with the Titrometer.

Sartorius Balance is a high-speed instrument capable of accurately weighing analytical samples.



Mass Spectometer performs rapid and graphic electronic analysis of the process gases.

Sohio provides GUARANTEED ANALYSIS of each batch

Every tank car, every tank truck is checked before it is released to Sohio customers. This is your assurance of maintaining the quality of your own product.

your source
for this complete line of
high-quality nitrogen
products:

AMMONIA
Anhydrous
and Aqua

AMMONIATING SOLUTIONS
Ammonia with
ammonium nitrate
and/or urea

UREA
Bagged or bulk
Coated or uncoated
Fertilizer grade —
Feed grade.

NITROGEN SOLUTIONS
All combinations of
ammonia, ammonium nitrate
and urea

TECHNICAL SERVICE AVAILABLE

- Capable technicians, engineers and agronomists ready to serve you.
- Outstanding laboratory with staff experienced in chemical research and manufacturing problems.
- Qualified independent research organizations with specialized facilities are on call when required.

WE'RE ON STREAM, READY TO SERVE YOU

- Sales representatives will be happy to make a personal call at your plant and discuss formulation and materials best suited to your individual needs.
- Our complete facilities are at your disposal, ready to serve you during the coming season. We will be pleased to have the opportunity to earn your confidence as a dependable supplier.

SOHIO

SOHIO CHEMICAL COMPANY
P. O. BOX 628
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plant pests
economically
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4. Fast killing action of pyrethrum – *free from toxological hazards!*

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FORMULATIONS

GEIGY DIAZINON is the most effective and economical residual fly control chemical available. Because of its long residual action, only two or three residual sprays are required to control flies in dairy barns for an entire season. This amounts to only a few cents per day for effective fly control in an average size dairy barn.

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METAL CHELATES

SEQUESTRENE* iron chelates are the original metal chelates in the field of agriculture. They are designed for the correction of iron deficiency (chlorosis) in ornamentals, fruit trees, vegetables and turf. SEQUESTRENE chelates may be applied as soil applications or foliage sprays. Completely water soluble and compatible with fertilizers and most commonly used pesticides, SEQUESTRENE iron chelates are available for use on both acid and alkaline soils.

CHLOROBENZILATE
FORMULATIONS

GEIGY CHLOROBENZILATE is a safe, effective miticide for control of various species of mites on apples, pears, azaleas, holly, spruce, and other ornamental and agricultural crops. In addition to being safe to humans, it is relatively non-toxic to bees in field applications. It has long residual action and is compatible with most commonly used insecticides and fungicides.

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GEIGY METHOXYCHLOR is the "general purpose" insecticide for control of plum curculio, grape berry moth, cucumber beetle, leafhoppers, and many other insects attacking fruit, vegetables and forage crops. Residual sprays applied to empty grain bins are effective in controlling many insect pests of stored grain. Direct applications to livestock are effective in controlling horn flies, lice and ticks.

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*"SEQUESTRENE" is the brand name for metal chelates sold by GEIGY AGRICULTURAL CHEMICALS, division of Geigy Chemical Corporation.

This huge fertilizer plant at Webb City, Missouri, is one of two operated by the Tri-State Chemical Company. This eight-year-old company also has a plant at Springdale, Arkansas. Tri-State serves Missouri, Oklahoma, Arkansas and Kansas with Gro-Mor Brand Fertilizers.

L. J. Savana is the president and general manager of the Tri-State Chemical Company, Webb City, Mo.

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On time deliveries of SPENSOL solutions have helped to build Spencer's reputation for dependable service to mixers throughout the country.

Spencer agronomists are there! Spencer's team of experienced agronomists is constantly at work helping to educate your present and future customers.

Mr. N

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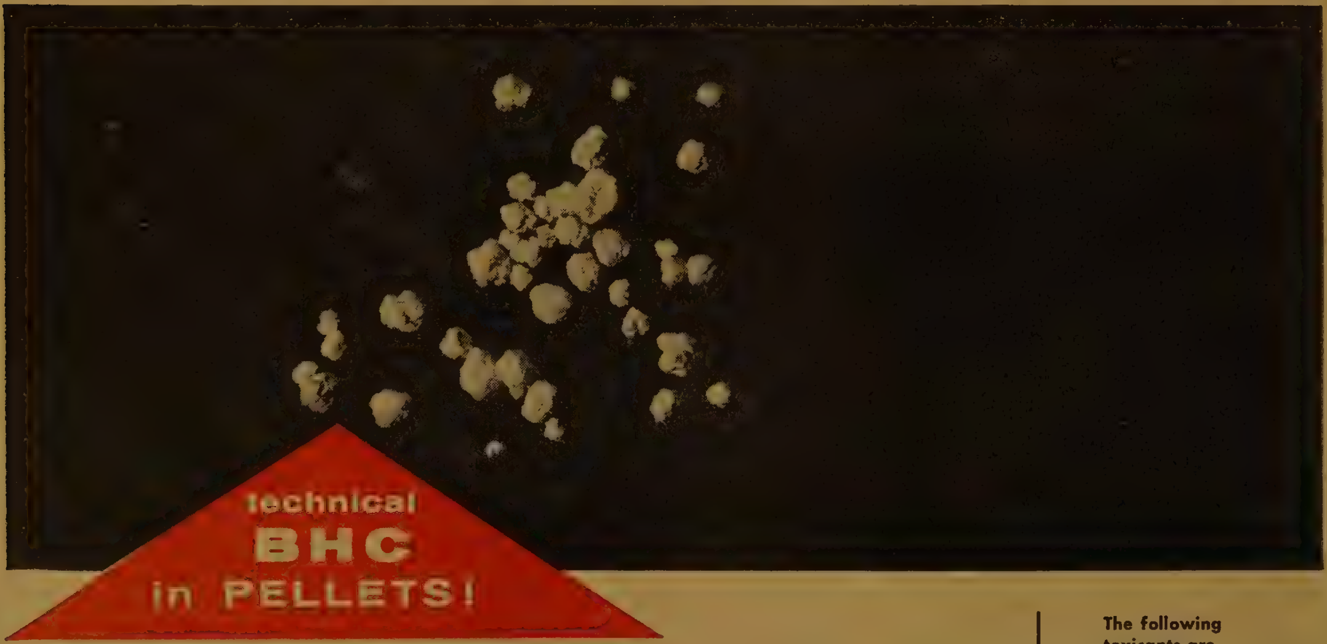
Every Stauffer Dust Base is prepared for the formulator's use. None is offered to the market until rigid tests have *proved* that diluents and other inerts are compatible with the widest range of toxicants . . . that they will not inhibit toxicant action . . . that they contribute to shelf life and efficiency . . . that they will not abrade equipment.

Stauffer plants and offices provide scientific and practical service geared to the needs of growers and formulators throughout the year.



. . . is the newest Stauffer product for formulators. It is made specifically to solve the grinding problems common to other BHC concentrates. These new pellets grind down easily without gumming or sticking. They improve your production throughput and product quality. Stauffer pelletized BHC is the only 24-gamma technical material. Regular 40-gamma technical and BHC Dust Bases are available.

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Stimulate fertilizer sales with the addition of Tennessee's Nutritional Manganese Compounds.

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65% $MnSO_4$. Designed specifically for inclusion in mixed fertilizer or direct application to the soil.

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Minimum 41% Manganese as metallic. A neutral, finely divided, water insoluble form of nutritional Manganese designed specifically for direct foliar application as a spray or dust or in combination with other foliar applied pesticides.

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Minimum 48% Manganese as metallic. For fertilizer mixing, direct foliar application, direct soil application, and animal feeds.

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Tennessee's Nu-Z, Nu-Iron, Nu-M and Tri-Basic Copper Sulfate are especially suited for use in preparing nutritional and fungicidal spray and dust mixtures and for use in mixed fertilizers.

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"HORSE & LION" Calcium Nitrate: 15½% pure nitrogen, comibned with about 20% available lime. Granulated.

"HORSE & LION" Ammonium Nitrate Limestone: 20½% pure nitrogen (10¼% nitric and 10¼% ammonic nitrogen) and approximately 32 to 33% calcium carbonate. Granulated.

"HORSE & LION" Ammonium Sulphate Nitrate: 26% pure nitrogen (11% nitric and 15% ammonic nitrogen). Granulated.

"HORSE & LION UREA 44": 44% pure nitrogen. Coated pellets for dry use.

"HORSE & LION UREA 46": 46% pure nitrogen. Pellets without coating for liquid application or dry use where fast dissolving desired.

For complete information and prices, contact your nearest "HORSE & LION" fertilizer headquarters.

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ESTABLISHED 1906

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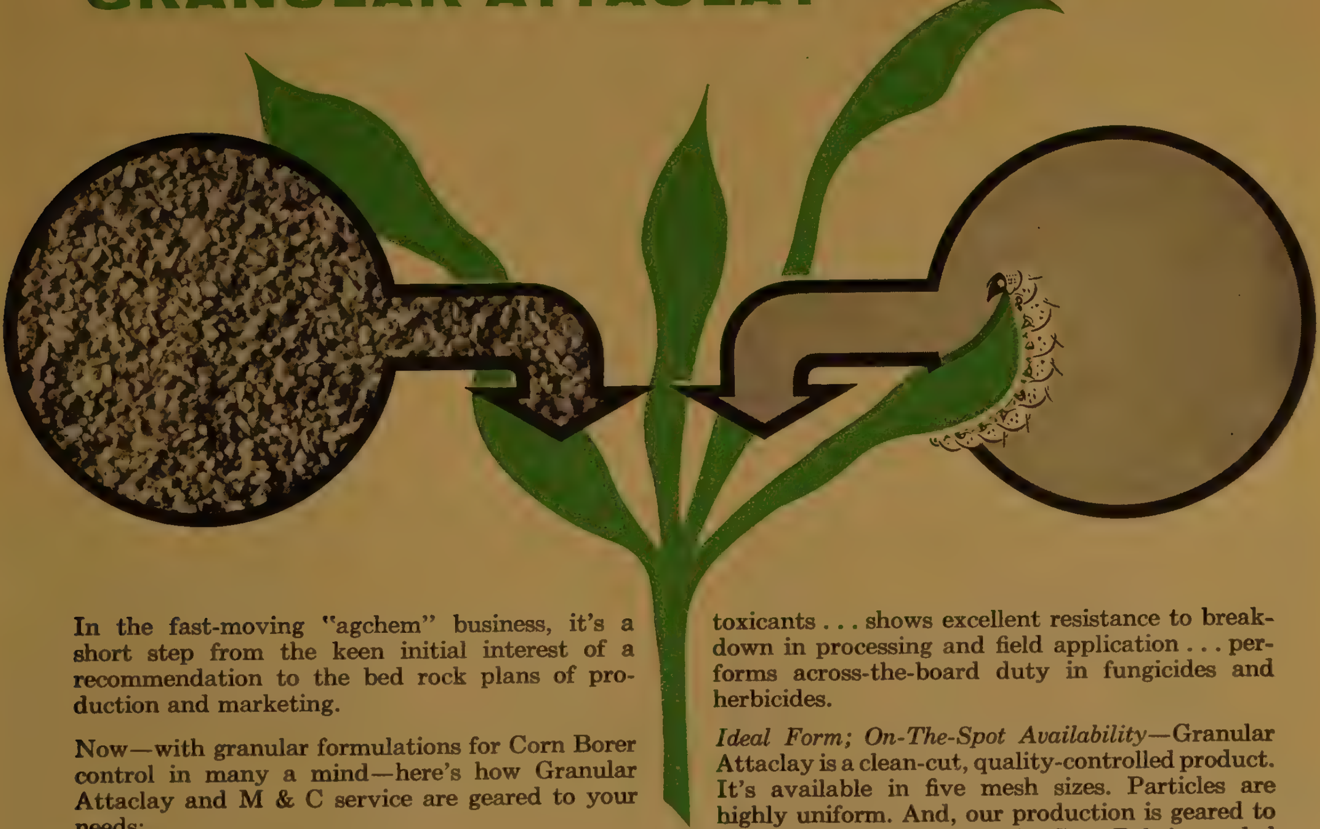
a timely and important message to formulators

For Your **Corn Borer Granular Pesticides** *standardize on the* **original, pioneer carrier—**

GRANULAR ATTACLAY ®



In the fast-moving "agchem" business, it's a short step from the keen initial interest of a recommendation to the bed rock plans of production and marketing.

Now—with granular formulations for Corn Borer control in many a mind—here's how Granular Attaclay and M & C service are geared to your needs:

Good History—Technological development in our own laboratories has produced the excellent properties in today's production of granular carriers for pesticides.

The Route To Superior Products—Granular Attaclay is highly sorptive . . . combines ideally with toxicants . . . shows excellent resistance to breakdown in processing and field application . . . performs across-the-board duty in fungicides and herbicides.

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Just off press—an edition of Pesticide Digest filled with facts about corn borer control and granular pesticides. Use the coupon for free copy, samples, technical help.

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Train Load of POTASH for Fertilizer
From Mines At Carlsbad, New Mex

EARLY IN 1931, to the cheers of townspeople, the United States Potash Company sent the first carloads of potash from Carlsbad, N. M., the then young center of the potash industry in the U. S.

It was an event of importance not only to the prosperity of New Mexico, but to the entire nation as well. Potash, as a vital component of the millions of tons of fertilizer used annually in agriculture and as a basic raw material for the chemical industry, has helped to build a richer America.

The Carlsbad area of New Mexico now produces almost 90% of the potash used in the nation. USP, which continues to build and expand with modern equipment and production methods, is proud to have been the pioneer developer of the great mineral resources of this area.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

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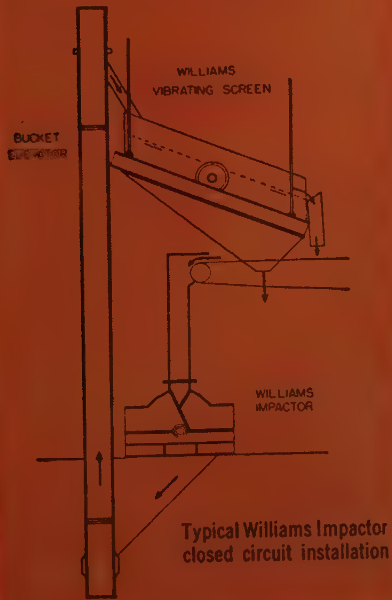
Lowest-Cost Crushing

with better product control

Open view showing hammers and impact blocks. Extremely rugged, heavy construction of steel plate with manganese steel liners, hammers and impact blocks. Extra large shafts are mounted in oversize bearings sealed in self-aligning housings.



Typical Williams Impactor closed circuit installation

WILLIAMS *Reversible* IMPACTOR

By properly controlling the forces of speed and mass in size reduction operations, Williams Impactors offer the lowest possible cost-per-ton in producing top quality materials from 2″ down to 35 mesh with a minimum of fines . . . or much smaller where more friable products are handled. In closed circuit systems with external vibrating screens, a single Impactor promises 100% product sizing with surprising economy, even with the most difficult specifications.

No grates are required, hence no replacement expense of these parts is necessary. Quick, uniform reduction, sizing and discharge from the mill eliminates any grinding attrition action that causes excessive wear, especially if raw materials are highly abrasive. Reversible rotation eliminates manual turning of hammers and minimizes down time. Impact blocks are also reversible which further reduces cost. Parts last up to 7 times longer than in other types of equipment. Unusually low maintenance is a feature of the Impactor.

You have much to gain in lower costs and better product quality control with an Impactor. *Write for literature.*

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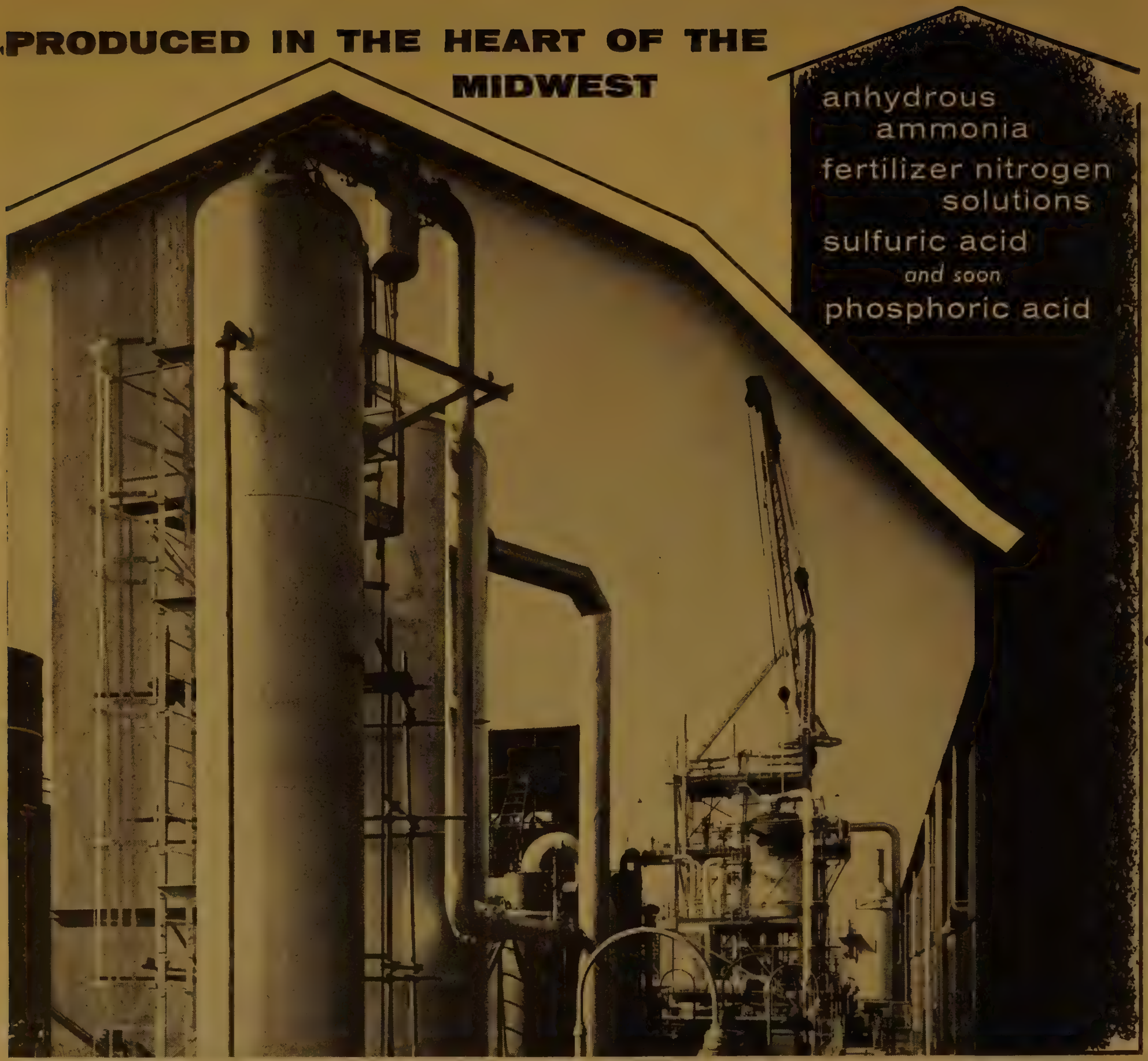
Hammer Mills Helix-Seal Mills Roller Mills Air Separators Vibrating Screens Feeders

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

PRODUCED IN THE HEART OF THE MIDWEST



AT TUSCOLA, ILLINOIS — in the heart of the midwest farm area — U.S.I. produces a combination of agricultural chemical raw materials for fertilizer manufacturers.

Anhydrous Ammonia and Fertilizer Nitrogen Solutions From other U.S.I. affiliated plants at Tuscola, and from a natural gas reforming unit, hydrogen flows into the U.S.I. ammonia plant, where it is reacted with nitrogen to produce anhydrous ammonia and nitrogen solutions. Since the raw materials for this operation are produced internally, supply is steady, reliable and ample.

Sulfuric Acid U.S.I.'s 400 ton per day sulfuric acid plant produces all grades of virgin acids, including electrolytic and oleum, plus a good quality of process-spent acid suited to fertilizer manufacture. This plant operates year round, permitting U.S.I. to store during off-seasons for the large in-season agricultural demand. Other sulfuric acid plants are located at Dubuque, Iowa, and Sunflower, Kansas.

And Coming Soon — Phosphoric Acid U.S.I. is building a new plant at Tuscola to produce wet process phosphoric acid from phosphate rock and U.S.I.'s sulfuric acid. The plant is scheduled to go on-stream by the end of 1956. Design capacity will be 30,000 tons of P_2O_5 shipped as 75% phosphoric acid.

In the midst of the midwest farm area — where fertilizer demand is high and moving steadily higher — U.S.I. provides a single source for a variety of fertilizer raw materials. This source is a flexible one, since it is part of the company's chemical producing center at Tuscola. Other materials can be made for long-range demands.

For further information, address your nearest U.S.I. office, or contact Chemical Sales, U.S. Industrial Chemicals Co., 99 Park Avenue, New York 16, N. Y.

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AMINO TRIAZOLE has proved very effective in killing reeds and many other perennial weeds. Photo at left shows phragmites shortly after spraying with AT (note typical whitening of plant) Photo at right shows same area one year later—with the phragmites completely killed.

You ought to know AMINO TRIAZOLE unique new weedkiller, defoliant and growth inhibitor

AMINO TRIAZOLE not only defoliates cotton, but also inhibits regrowth. This whole cotton field was defoliated at the same time. Amino Triazole was used in area at left and prevented second growth. Plants at right received no AT and sent out new leaves which complicated mechanical harvesting.

Photo courtesy of Delta Branch Experiment Station

AMINO TRIAZOLE is a remarkable, new chemical that kills many hard-to-control weeds. It also gives, for the first time, combined defoliation and regrowth control in cotton.

AMINO TRIAZOLE is taken into the sap stream of the plant. It does its work *inside* the plant—both above and below ground! It unbalances the chlorophyll-producing mechanism of the plant . . . suppresses growth . . . eventually kills the roots.

AMINO TRIAZOLE is a *selective* herbicide. It has proved effective in control of such troublesome weeds as Canada thistle, sow thistle, poison ivy, poison oak, quack grass, nut grass, horsetail, phragmites, Russian knapwood and many others.

At rates of ½ to 1½ pounds per acre, AT defoliates cotton *and* controls regrowth for a sufficient time to permit early harvesting.

Here is another exciting new development of Cyanamid agricultural research. For further information, just drop us a line.

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AGRICULTURAL CHEMICALS DIVISION
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- MALATHION Technical
- CYANOGAS® Calcium Cyanide Fumigants
- HCN Fumigants
- POTASSIUM CYANATE Weedkiller for Agriculture and Turf

*Trade-mark

Editorial
COMMENTS

EVERYONE talks of extending and expanding the market for pesticides, but too few have actually done any thing about it. A notable exception has been in the field of nematocides. A number of companies have been developing effective products for nematode control over recent years, and with several of these new pesticidal tools now tested, proved and ready for commercial use, the door is open for a rather substantial expansion in sales volume in this new corner of the pesticide market.

Use of nematocides has grown rapidly in the past few years. In North Carolina, where they are now being employed effectively and profitably, in sizeable volume, 231,000 acres of tobacco land were fumigated for nematode control in 1955. There seems to be a big potential market, too, in the protection of home and market garden crops, with one authority estimating the loss to such crops in North Carolina, due to root knot nematode, at approximately five million dollars per year.

A number of new nematocides have been developed in recent years, with some at the commercial stage and others still under test. (See *Agric. Chemicals*, February, 1956, pg. 61). An up-to-the-minute report on one of the most promising of these materials appears in this issue. (See pg. 46-47). While less speedy and dramatic in action than some of the so-called "miracle" products that we were accustomed to hearing about in the pesticide field a few years back, the new nematocides are reported to do a dependable job of reducing soil infestations and increasing yields in a dramatic way. Good features of these new materials are that they offer residual control over an extended period, and can be employed safely on living plants, unlike the fumigants employed earlier which are restricted to the pre-planting stage.

If in the coming season, under widespread commercial usage, these new products live up to their early promise, they may well be counted upon to widen the pesticide market appreciably. And any pesticide formulator, dealer, distributor or pest control operator who is not already in touch with these new developments in the field of nematode control would do well to catch up on the subject without further delay.

A STRONG warning of a substantial excess in productive capacity for anhydrous ammonia was sounded by Kenneth A. Spencer, president of Spencer Chemical Co., in a mid-February talk before the New York Society of Security Analysts. This is the latest in a series of warning notes that have been sounded by industry leaders since the tremendous wave of expansion in anhydrous ammonia plant capacity started four or five years ago. Mr. Spencer estimates that in spite of increasing demand there will still be a 15 to 20 per cent surplus of potential supply for the next several years.

(Continued on Page 125)

Grasshopper Control

By James R. Dutton
USDA Agricultural Research Service
Denver, Colorado

Insecticide storage and loading facilities are located stripside, to facilitate filling aircraft with spray solution.

THE 1956 outlook map shows that cropland grasshopper infestations will vary from light to severe in parts of Minnesota, Wisconsin, Iowa, and the northern half of Illinois and Indiana. Some damage can also be expected to crops in certain areas of California, Michigan, Ohio, Missouri, Texas, in the eastern third of North Dakota, South Dakota, and Nebraska, and over the most of Kansas and Oklahoma unless there is timely control. Most of the remaining States to the west can expect some damage to crops in isolated areas.

The rangeland grasshopper surveys made by the U.S. Department of Agriculture and cooperating States during the late summer and fall of 1955 showed 16 Midwestern and Western States to have areas totaling 20,375,000 acres where there are sufficient eggs in the ground to cause outbreaks if more or less normal weather conditions prevail. The largest continuous infestation, in terms of acres, was found in an area involving parts of western Oklahoma, southwestern and south-central Kansas, extreme southeastern Colorado, the panhandle of Texas and eastern New Mexico. Range infestations must be anticipated also in Montana, California, Nebraska, Oregon, Wyoming, Arizona, Idaho, Utah, Washington, Nevada, and Missouri. The prolonged drouth, that is now in its sixth year in many of the range areas of the West, has been a contributing factor. The proportion of this vast acreage that will need spraying will depend upon weather during the critical period when the young hoppers are hatching.

Research conducted by the States of Wyoming and Montana and by the U.S. Department of Agriculture has shown that even very low populations of grasshoppers on rangeland may deprive grazing livestock of half of their food. Stated differently, if infested rangeland is freed of grasshoppers, its livestock-carrying capacity may be doubled, or more.

In 1955, 1,648,000 acres of rangeland were sprayed for grasshopper control in eleven Western States at an average cost of 58¢ per acre. Amortized over a five-year period—the average length of time it takes the pests to build up again to damaging numbers—the annual cost of control would be about 12¢ per acre. The cost included insecticides, formulation and transportation, supervision, and hire of airplanes contracted to apply the spray.

Spraying of privately-owned rangeland may become a Federal-State and local cooperative undertaking if the outbreak threatens severe damage over wide areas and local facilities are inadequate to meet control requirements. In such instances, and particularly when migratory species are involved, the Federal Government will participate to the extent of one-third of the cost. However, in no instance in recent years has the Federal Government participated in actual control work beyond one-third of the cost, the remaining two-thirds coming from States, counties and organized groups of ranchers.

In the case of public lands, a greater share of the cost is borne by the Federal Government, but in such instances the land users and, in many cases, the States, take an active part in the program.

When severe outbreaks develop in cultivated crops, Federal participation is available to the extent of some technical assistance in defining areas needing treatment and advising what controls should be used for best results and when to apply them. In other words, except for technical assistance, grasshopper control for the protection of cultivated crops is a responsibility of the individual farmer.

The application of organic insecticides for the control of insects other than grasshoppers has changed the grasshopper control problem over some sizeable areas. For example, a very light grasshopper infestation is ruinous to young cotton plants, and control in cotton fields is imperative. This used to be a separate operation because the insecticides used against other cotton insects did not kill the grasshopper. Now, cotton is sprayed for control of cotton insects each season with multiple applications of organic insecticides that also kill grasshoppers. The indirect result is that the grasshopper problem has virtually ceased to exist over extensive areas where crops receive frequent treatments to control other pests.

Grasshoppers are native insects in the United States. They damaged crops of the Colonists and have continued their destructive role ever since. As settlement advanced westward, grasshoppers were treated to new delicacies. With each successive expansion of planted acreages, a favorable food supply for the insects became more abundant and hazards of survival diminished. Thus, profitable production of food for humans and livestock, of seed and ornamentals and fiber used in industry, has from the start been a struggle between man and his enemy, the grasshopper.

Grasshoppers were feeding on native vegetation before pioneers broke the land to prepare it for planted crops. Some grasshopper species that preferred their native plants have not proved to be serious crop destroyers. Other species became crop pests in rather definite geographical areas to which climatic or food-plant limitations restricted them. They occasionally became seriously injurious outside their native habitats under unusual and temporary conditions. Native grasshoppers attack crops in every region in the United States and require periodic control to prevent excessive losses. In some regions, grasshoppers damage crops almost every year, year after year. These so-called "grasshopper regions" are the arid or semi-arid belts where annual rainfall normally is less than 20 inches. Though crop losses and the necessity for grasshopper control occasionally may be as acute in other States, they involve less extensive areas and occur less frequently.

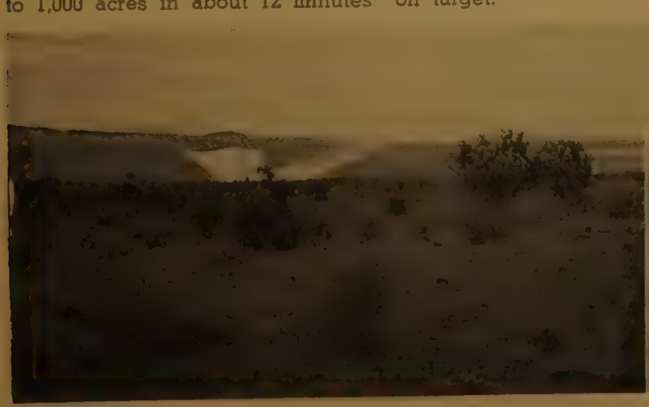
On the rangelands of the West, native species of grasshoppers frequently seriously reduce the capacity of vast areas of rangeland to carry livestock and wildlife. Many kinds of grasshoppers are involved. They do not all feed alike. Some live on grass, others on browse plants, while still others may not noticeably damage forage plants.

Most species do not spread far from where they hatched, so have come to be considered as non-migratory. In a succession of years favorable to development and spread, they may eventually infest extensive areas. In the group that attack planted crops, some of the most important species that most farmers and ranchers commonly recognize are the two-striped grasshopper, the differential grasshopper, the red-legged grasshopper and the clear-winged grasshopper.

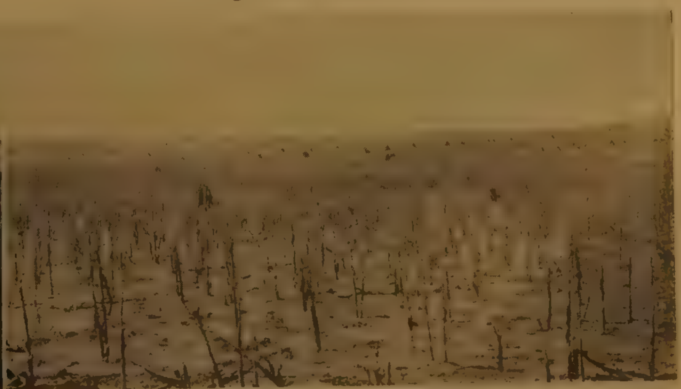
A few species are known as migratory because, at times, they spread hundreds of miles by flight. Most important among those are the migratory grasshopper that caused the heavy, widespread destruction in all of the Great Plains areas in the late nineteen thirties, and the High Plains during the same period.

The story of grasshopper control is largely the story of the development of chemicals that kill insects cheaply and safely, and of improved equipment to apply such chemicals. Effective use of a bran-Paris green bait in California in 1885 provided virtually the first practical control of grasshoppers. After that, use of improved and cheapened baits remained the only insecticidal means of grasshopper control until the discovery and development of organic insecticides. Chlordane and toxaphene were used widely, but not in great volume, by 1947. Since then, aldrin, dieldrin, and heptachlor have increased the impressive list of chemical grasshopper killers.

Now, spraying almost completely eliminates grasshoppers. So few escape its effect that they cannot increase to damaging numbers for years afterward. Where formerly 20 pounds of wet bait were spread on one acre of land, now only one gallon of aldrin-diesel oil solution containing 2 ounces of aldrin to the gallon is needed. With wet bait and hand methods one man was taxed to apply 60 pounds to 3 acres in a day. Now, with multi-engined aircraft using sprays, 8,000 to 10,000 acres is a day's work. That is why spraying has almost completely displaced baiting in grasshopper control, and why it is feasible to control grasshoppers on low-value rangeland.★★



DC-3 type plane shown can apply 1,000 gallons to 1,000 acres in about 12 minutes "on target."



Typical crop grasshopper damage. Destroyed corn in foreground; shocked sorghum in background.

Pilot Plant Studies of Granulation of High Analysis Fertilizers

By T. P. Hignett*
Tennessee Valley Authority
Wilson Dam, Alabama

GRANULATION of high-analysis fertilizers has been studied by TVA on a pilot-plant scale for nearly three years. The objective of this project is to develop effective and economical methods and equipment for granulation as a means of improving the physical properties of high-analysis fertilizers. The results of the pilot-plant studies were reported in a paper presented at the 128th national meeting of the American Chemical Society(1). The present report briefly describes the pilot plant and presents in some detail the results obtained with one fertilizer, 5-20-20, since many manufacturers are particularly interested in this grade. Pilot-plant results for other grades are reviewed briefly.

The experimental work was done in a pilot plant that had a capacity of about three tons of granular product per hour. Figure 1 (page 143) is a diagram of the pilot plant.

Superphosphate, potassium chloride, recycled fines, and any other solid materials that were required were fed by volumetric feeders to a collecting belt and thence to the continuous ammoniator. No preparatory treatment of the materials was needed, unless they were caked or contained large lumps that might clog the feeders; in this case the materials were crushed to pass a 4-mesh screen. Finer grinding was not required and was not considered to offer any particular advantage.

The continuous ammoniator(2) is 3 feet in diameter by 3 feet long. It usually was rotated at 15 r.p.m. The bed depth in the ammoniator was 9 inches, and the retention time was about 3 minutes when operated at a throughput of 3 tons per hour. Ammonia or ammoniating solution or mixtures of the two were injected under the bed of material through a special distributor. Sulfuric acid, phosphoric acid, or steam was supplied through an adjacent distributor. Air for cooling and controlling granule size was supplied from a drilled pipe located over the bed of material. The drilled holes in the pipe were located so as to direct air jets onto the surface of the bed. When water was needed for granulation, it was either sprayed on the surface of the bed, or mixed with the ammonia or ammoniating solution in the pipe line leading to the ammonia distributor. The latter arrangement was preferable. A stream of air was drawn through the ammoniator to sweep out water vapor and fumes.

The material flowed from the ammoniator through a chute to the granulator, which was an open cylinder 24 inches in diameter by 6½ feet long. It usually was rotated at 20 r.p.m. From the granulator, the material flowed to a cooler, which was 3 feet in diameter by 24 feet long and contained flights. The flow of air in the cooler was countercurrent to the flow of solids. The temperature of the material leaving the cooler was about 100° F. In a few cases the cooler was used as a dryer with cocurrent firing.

A set of screens, a crusher, and conveying equipment were used to size the product at approximately minus 6 plus 28 mesh. The undersize was recycled to the ammoniator.

Factors Affecting Granulation

THE most important factor affecting granulation was the formulation. The formulation determined the heat of reaction and the amount and character of the soluble salts; these factors strongly influenced granulation. The best results were obtained when the formulation was self-granulating or nearly so. By a self-granulating formulation we mean that, when the constituents are brought together, the soluble salt content, the moisture content, and the temperature resulting from the heat of reaction are such as to impart a a suitable consistency for forming granules with only minor adjustment of the temperature or moisture content.

Poor results were obtained when the formulation was such that a large amount of water was required for granulation. Although it was possible to induce granulation at low temperatures by addition of large amounts of water, the granules often were weak and disintegrated during drying, which was required because of the high moisture content.

Poor results also were obtained when the formulations led to excessive agglomeration due to too much heat of reaction. The formation of too much oversize led to impaired efficiency of ammoniation and fume formation and interfered with efficiency of the subsequent cooling operation.

No method has been developed for predicting accurately the granulation characteristics of a formulation. It seems probable that the granulation obtained with a given formulation may vary depending on such factors as design of the ammoniator, heat losses from the ammoniator, effectiveness of temperature control in the ammoniator, physical properties of the superphosphate, and initial temperature of materials entering the ammoniator. For these reasons, it should be expected that some experimentation would be required in each plant to find the best formulation for good granulation of any particular grade.

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*Presented at the Fertilizer Industry Round Table meeting, Washington, D.C., October 11, 1955.

In addition to the selection of a formulation that provides proper conditions for granulation, it is very desirable to provide operating controls to obtain the most efficient granulation. One effective and convenient method that was developed and used in the pilot plant was the use of air jets directed onto the bed of material in the ammoniator. The air jets cooled the material in the ammoniator and evaporated water from the surface of the granules, thereby decreasing the amount of oversize formed. Control of granulation by air cooling was effective when the formulation was such that too much agglomeration would occur otherwise.

Recycling of some of the cooled products was found to be effective in controlling overagglomeration. However, this method was not generally used in the pilot plant because it was inconvenient to handle the large amount of recycle that would be required for effective control. In most runs, only the fines normally produced were recycled, which amounted to 10 to 25 per cent of the product.

When the formulation was such that the extent of granulation was insufficient, additions of steam or water were sometimes effective in increasing it.

TABLE I.

Pilot-Plant Data for Production of Granular 5-20-20 Fertilizers

Test No.	J-1	J-2	J-3	J-4	J-5	J-6	J-7
Formulation, lb./ton of product							
Anhydrous ammonia	......	......	103	50	129	127	......
Nitrogen solution[a] (X, Y, or Z)	259(y)	252(y)	85(x)	180(x)	......	......	308(z)
Sulfuric acid (66° Be.)	......	143	92	......	139	......	123
Ordinary superphosphate	398	260	292	293	278	774	460
Concentrated superphosphate	675	741	807	810	769	......	......
Calcium metaphosphate	......	......	......	......	......	......	513
Phosphoric acid	......	......	......	......	......	380	......
Potassium chloride	690	669	628	630	643	645	641
Total	2022	2065	2003	1963	1958	1926	2045
Recycle, lb./ton	441	397	386	356	304	829	330
Means of granulation control	Water	Variation of acid rate	Water	Water	Water and air	Water	Water and air
Ammoniator temperature, °F.	140	206	235	176	207	176	166
Moisture content of product, %							
From ammoniator	12.6	4.4	3.7	7.5	5.9	9.0	......
Final product[b]	4.1[c]	1.7	2.0	4.5	3.9	......	0.6
Granulation, %							
Oversize	34	35	36	31	28	31	29
Onsize	55	57	63	65	70	58	66
Undersize	11	8	1	4	2	11	5
Onsize recovery after crushing oversize, %	83	88	81	87	91	86	91

[a] Composition of nitrogen solution:

	Per Cent		
Solution	NH_3	NH_4NO_3	H_2O
X	21.7	65.0	13.3
Y	26.0	55.5	18.5
Z	16.6	66.8	16.6

[b] Product was cooled but not dried except as indicated.

[c] Product was dried.

Production of Granular 5-20-20

JUDGING from comments that we have received from fertilizer manufacturers, 5-20-20 is an important grade that has given an unusual amount of difficulty in granulation plants. For this reason, several formulations for producing this grade were studied in the pilot plant. The formulations used and typical data obtained in these runs are shown in Table I. The formulations were calculated from actual feed rates; due to inaccuracies of the feeders, the proportions of the ingredients were sometimes appreciably different from the intended proportions. For this and other reasons, some of the formulations are not consistent with production of ongrade product.

In test J-1, ammoniating solution Y (26% free ammonia) was used to supply all of the nitrogen; water addition was the only means of granulation control. The heat released by the ammoniation reaction was not sufficient to permit granulation at low moisture content. It was necessary to add water to increase the moisture content to about 13 per cent to obtain granulation. The efficiency of granule formation was satisfactory, but the percentage of both oversize and undersize increased during drying, leaving only 42 per cent in the desired size range. After crushing the oversize, only 72 per cent was onsize. The dried granules were weak and dusty.

The need for artificial drying was eliminated and the stability of granules was improved by adding sulfuric acid to the formulation. The heat generated by the reaction of the acid with the free ammonia increased the temperature in the ammoniator. At the higher temperature, more liquid phase was formed by the solu-

Formulation an important factor in granulation . . . it determines the heat of reaction, the amount and character of the soluble salts. Poor results are obtained when large amounts of water are required in the process for granulation.

tion of soluble salts, and no water addition was needed for granulation. This use of acid to promote granulation is illustrated by test J-2. Best operation was obtained when the acid rate was 143 pounds of acid per ton of product. Fifty-seven per cent of the granulator product was onsize. There was very little breakdown of particles in the cooler. Onsize material, including the crushed oversize, amounted to 80 per cent of the total product. The moisture content of the product was only 1.7 per cent even though artificial drying was not used.

During a part of test J-2 the acid rate was increased to 170 pounds per ton of product. Overagglomeration resulted, and operation was inferior at the higher acid rate. When the acid rate was reduced to 90 pounds per ton, there was too little granulation.

In test J-2 the degree of ammoniation was low, about 1 pound of ammonia per unit of P_2O_5. Consequently, the ammonia loss was very low, 0.1 per cent or less, and the water solubility of the P_2O_5 was very high, about 75 per cent.

TABLE II.

Pilot-Plant Data for Production of Various Grades of Granular Fertilizers

Grade	10-10-10	12-12-12	15-15-15	15-15-0	6-12-12	8-16-16	10-20-20
Formulation, lb./ton of product							
Nitrogen solution[a] (X, Y, or Z)	459(x)	431(x)	513(z)	485(x)	329(y)	386(y)	499(x)
Ammonium sulfate	96	206	574	494	......	......	......
Sulfuric acid (66° Be.)	116	126	......	129	......	......	93
Ordinary superphosphate		647	......	564	1265	1059	......
Concentrated superphosphate	......	252	306	390	......	......	854
Phosphoric acid (28 to 85% H_3PO_4)	......	......	256	......	......	211	......
Potassium chloride	338	383	472	......	414	522	620
Total	2085	2045	2121	2062	2008	2178	2066
Recycle, lb./ton	320	465	518	340	431	601	392
Means of granulation control	Air	Air	Air	Air	Steam	......	Air
Ammoniator temperature, °F.	202	199	144	190	187	183	197
Moisture content of product, %							
From ammoniator	2.8	2.4	3.9	4.2	7.3	4.7	2.9
Final product[b]	1.5	1.5	0.4[c]	2.6	4.2	1.4[c]	1.1
Granulation, %							
Oversize	20	29	54	37	37	26	30
Onsize	69	66	45	60	49	62	69
Undersize	11	5	1	3	14	12	1
Onsize recovery after crushing oversize, %	83	88	81	87	78	86	91

[a] Composition of nitrogen solution:

	Per Cent		
Solution	NH_3	NH_4NO_3	H_2O
X	21.7	65.0	13.3
Y	26.0	55.5	18.5
Z	16.6	66.8	16.6

[b] Product was cooled but not dried except as indicated.

[c] Product was dried.

The foregoing tests showed that operation with nitrogen solution as the source of nitrogen was much improved when sulfuric acid was added to supply heat by reacting with the free ammonia. Two additional tests were made to determine whether similar results could be obtained by adding part of the nitrogen as anhydrous ammonia. Thus, the amount of free ammonia available to react with the superphosphate was increased, and more heat from this source was released in the ammoniator. The nitrogen solution (solution X in these tests), anhydrous ammonia, and water required for granulation were all injected through the same distributor. In test J-3, about 4 units of nitrogen were supplied as anhydrous ammonia, and slightly over 1 unit was supplied as solution. Ninety-two pounds of sulfuric acid were added per ton of product in order to reduce the degree of ammoniation to about 4 pounds of free ammonia per unit of P_2O_5. Good operation was obtained under these conditions. Almost two thirds of the material from the granulator was onsize, and there was practically no undersize. There was little breakup of particles in the cooler. Eighty-eight per cent of the product was onsize after the oversize was crushed. The moisture in the product was 2 per cent. The ammonia loss was only 1.8 per cent.

In test J-4, about 2 units of nitrogen were supplied as anhydrous ammonia; the balance was added as solution. With these proportions the degree of ammoniation was 3.9, and no sulfuric acid was added. Water was added in the quantity that appeared to give the best granulation. Granulation was not quite as good as in the previous test but was considered satisfactory. Eighty-three per cent of the product was onsize after the oversize was crushed. The moisture in the product was 4.5 per cent. The ammonia loss was 3.0 per cent.

In a series of tests, of which test J-5 is typical, all of the nitrogen was supplied in the form of anhydrous ammonia. It was necessary to add sulfuric acid to prevent excessive ammonia loss and to add water to give enough liquid phase for agglomeration. In some of the tests, the water was added through an air-atomized spray on the surface of the bed of material in the ammoniator. Liquid ammonia and acid were distributed under the bed. Operation was poor because of frozen lumps which formed on the ammonia distributor and interfered with the rolling action of the bed. Much rodding was required. Fuming was severe. Granulation was fair but erratic. The ammonia loss was also erratic and reached as high as 15 per cent, although the degree of ammoniation was only 3.7 pounds of free ammonia per unit of P_2O_5. Increasing the acid rate from 158 to 179 pounds per ton did not improve operation.

In further tests, including test J-5, the water was premixed with the ammonia by teeing the water line into the ammonia line just upstream from the ammonia distributor. This change eliminated the formation of

(Continued on Page 141)

"Read the Label"... Safety Program Stressed at NAC Conference in Hollywood March 14-16

THE effect of Food and Drug legislation on farmers and growers throughout the nation will be discussed by George P. Larrick, U.S. Commissioner of Food and Drugs, at the spring meeting of the National Agricultural Chemicals Association. The meeting will be held in the Hollywood Beach Hotel, Hollywood, Fla., March 14, 15 and 16.

Other features of the three-day meeting will include reports on the latest advances in the use of atomic energy in agriculture, the future of fungicides in controlling plant diseases, and a special report on the NAC Association's program to promote the safe use of agricultural chemicals.

In announcing the program, L. S. Hitchner, NAC executive secretary, stated, "The growing importance of chemical control to farming efficiency is underscored by the fact that insects, plant diseases, weed and other farm pests are expected to destroy the output of nearly five billion man-hours of productive farm work in the United States this year. All measures used to control these pests effectively and safely will have a direct bearing on farmers' net income and on raising standard of living.

The program on Wednesday, March 14, will include a report on the industry by NAC president, W. W. Allen, Dow Chemical Co., Midland, Mich.; an address on the part land grant colleges play in developing new agricultural chemicals, entitled "Universities and the Chemical Industry," by Dr. J. Wayne Reitz, president, University of Florida; a talk on the marketing of pesticide chemicals, entitled "The Agricultural Chemicals Industry—A Teen-Ager Growing Up," by John A. Field, Carbide and Carbon Chemicals Co.,

(Continued on Page 123)

SPRING MEETING

Hollywood Beach Hotel, Hollywood, Florida
March 14-16, 1956
TENTATIVE PROGRAM

WEDNESDAY — MARCH 14

9:45 A.M. M. C. Van Horn, chairman, program committee, Florida Agricultural Supply Co., Jacksonville, Florida.

10:00 A.M. "President's Address"
Mr. W. W. Allen,
Dow Chemical Co., Midland, Mich.

10:30 A.M. "Universities and the Chemical Industry"
J. Wayne Reitz, Univ. of Florida, Gainesville, Fla.

11:00 A.M. "The Agricultural Chemicals Industry — A Teenager Growing Up"
John A. Field, Carbide & Carbon Chemicals Co., New York City.

11:30 A.M. "Atomic Energy in Agriculture"
S. B. Hendricks, Soil & Water Conservation Research Branch, ARS, USDA, Beltsville, Md.

THURSDAY — MARCH 15

Committee Meetings—To be Scheduled

9:00 A.M. Board of Directors.

FRIDAY — MARCH 16

9:20 A.M. NAC vice president F. W. Hatch, Presiding.

9:30 A.M. Report of the Executive-Secretary
Lea S. Hitchner, Washington, D.C.

9:45 A.M. "Fungicides in Agriculture"
George L. McNew, Boyce Thompson Institute for Plant Research Yonkers, New York.

10:30 A.M. "Food and Drug Legislation"
Hon. George P. Larrick, Department of Health, Education, and Welfare, Washington, D. C.

11:00 A.M. "USDA Programs Affecting Pesticides"
H. L. Haller, Crops Research, ARS, USDA, Washington, D. C.

11:30 A.M. "Economics and Research in the Cotton Industry"
H. G. Johnston, National Cotton Council, Memphis, Tennessee.

Left — An outside view of the Quimagra plant, showing drum storage.

Right — Railroad siding and clay delivery, storage and recrushing areas.

Left — View of liquid system, showing melting kettles, blending tanks.

Right — Oven used for flash drying of clay. Fired by an oil-burner.

Quimagra Is New Pesticide Source For Costa Rica

UNTIL recent months, insect control in Costa Rica was dependent upon outside sources of insecticides. Now, with Quimagra, Ltda. in full production, the Central American nation has a domestic source of agricultural chemicals to combat cotton insects, leaf cutting ants, coffee pests, locusts, soil insects, flies, mosquitoes and livestock pests. Among the latter is the screw worm, which has been especially destructive to the cattle industry.

In formulating insecticides, fungicides and herbicides in Costa Rica, Quimagra has brought several important features to the area.

First, because it is located adjacent to the Inter-American Highway and near the new international airport, it is in a position to supply its neighbors—Panama, El Salva-

First switch at Quimagra is thrown by Jose Figueres, Costa Rican president. Others (l.-r.) Antonio Cappella, administrator of plant operation and clay production, Bruce Masis, minister of agriculture and Joseph P. McKenna, engineer in charge of the plant construction.

Mr. Cappella (l.) talks with C. J. Fredrickson, chief operating head of the new pesticide company.

Top — Electric and steam power plant annex and truck loading platform.

Bottom — Workmen package pesticides with St. Regis bagger. Also shown is Raymond Roller Mill and automatic dust collecting equipment.

dor, Nicaragua, Honduras, British Honduras and Guatemala—with pesticides on short notice.

Secondly, Quimagra is providing technical representatives who will teach users and potential users the most beneficial methods of application of the products. C. J. Fredrickson, chief operating head of the company, states that "dissemination of knowledge relating to insects and plant diseases and their control" will be one of the primary functions of Quimagra. Mr. Fredrickson formerly was export manager for John Powell & Co., in New York. He is assisted in the plant by Antonio Cappella, administrator of plant operation and clay production. Francisco Seravalli is in charge of sales and development of the export market.

Because a pesticide plant is unique in Costa Rica, Quimagra is taking special precautions with toxic materials. "All modern safety precautions have been instituted and personnel have been carefully trained in the use of safety measures and safety equipment in handling and processing toxic materials," according to Mr. Fredrickson.

Joseph P. McKenna, consulting engineer, directed the design, construction and initial operation of the plant, in addition to training local personnel to operate the equipment. Basic suppliers in the United States also provided the services of their entomologists, pathologists and chemists to help Quimagra get started.

The formulation and grinding system for dusts and wettable powders is completely closed, operating by suction. Imported technical grade toxicants are mixed with local inert materials in the formulation process.★★

Another view of the modern equipment used at Costa Rican plant.

ESCAMBIA BAY

Dedicates

Prilling Tower . . . To concentrate "Ammonite," a 95% solution is dropped in a spray in the prilling tower, to solidify into a dry-pellet type fertilizer.

THE multi-million dollar Pensacola plant of the Escambia Bay Chemical Corp. in Pensacola, Fla., which currently is producing 200 tons of anhydrous ammonia daily, was formally dedicated on February 17th. Attending the ceremonies were southeastern fertilizer manufacturers and dealers, agricultural leaders, officials of Escambia Bay Chemical Corp., and its parent companies.

Completed in record time, the plant will supply an eight-state southern market with anhydrous ammonia and ammonium nitrate fertilizers. Construction was started in April, 1955, and production of ammonia began December 28, 1955. Ammonium nitrate solutions are now being shipped from the plant by rail and truck.

The plant has a daily capacity of 200 tons of anhydrous ammonia, 220 tons of 100 per cent nitric acid produced as a 56 per cent water solution, 275 tons of 100 per cent ammonium nitrate produced as an 83 per cent water solution, and 350 tons of pebbled or prilled ammonium nitrate. Ashcraft-Wilkinson Co., Atlanta, will distribute Pensacola's fertilizer output.

Description of the Process

MANUFACTURING facilities of the Pensacola plant provide for the production of 200 tons of anhydrous ammonia, 220 tons of 100 per cent nitric acid produced as a 56 per cent water solution, 275 tons of 100 per cent ammonium nitrate produced as an 83 per cent water solution, and 350 tons of pebbled ammonium nitrate daily.

The anhydrous ammonia is produced from natural gas, water and air. The nitric acid is produced by oxidation with air of a portion of the anhydrous ammonia production. The ammonium nitrate is produced by neutralizing the nitric acid with an additional portion of the anhydrous ammonia production.

The end products available for sale are anhydrous ammonia, pebbled ammonium nitrate (Ammo-Nite) and ammoniated nitrate solutions (Baysol).

The Pensacola plant employs the Nitrogen Engineering Corp. process of Chemical Construction Co. based on the Haber-Bosch method. It is the first plant of its kind in the United States to use a potassium carbonated absorption system for the removal of carbon dioxide. The plant's ammonia converter is designed to produce suffi-

Storage Spheres—Three spheres having a capacity of 2,000 tons each, or a total of one month's production, are used for ammonia storage.

CHEMICAL Corporation

New Plant at Pensacola, Fla.

. . . Ammonia Converter Nitrogen and hydrogen in the presence of a catalyst combine to form liquid ammonia.

cient ammonia to give a net production of not less than 200 short tons per 24 hours.

Ammonia Synthesis Plant

AMMONIA is manufactured by the joining of hydrogen and nitrogen molecules to form NH_3. The mixture is charged to the synthesis system and mixed with cycle gases at the discharge of the circulating compressors, at which point the greater part of the ammonia has been condensed from the circulation gas.

Ammonium Nitrate . . . Basic components of ammonium nitrate combine in the neutralizer shown here to form an 83% concentrate, "Bay-Sol".

The total gas flow is then precooled before admission to the ammonia-cooled secondary condensers where a final condensation of ammonia from the gas takes place. This final condensation of ammonia from the synthesized mixture of make-up and circulating gas is one of the features of the N.E.C. process in that the condensing ammonia stream tends to remove any impurities which might poison the synthesis catalyst.

Leaving the converter, the gases are cooled in the water cooled primary condensers where the greater part of the ammonia content is condensed and removed at the primary separators as liquid anhydrous ammonia. The uncondensed gases pass to the circulators for recirculation.

The ammonia, after being measured, is sent to one of four places: storage, tank cars and trucks, the nitric acid plant, or to the ammonium nitrate departments. Three hortensphere storage units with a capacity of 2,000 tons each are used for storage of the anhydrous ammonia.

Ammonium Nitrate Department

LIQUID ammonia from the storage tanks is vaporized and mixed with the 56 per cent nitric acid in a neutralizer to produce an ammonium nitrate solution of about 83 per cent concentration.

This solution is continually withdrawn to the process solution storage tank. From there it may be sent to either ammoniated solutions production storage, or to the prilling plant.

Ammoniated solutions are made by mixing ammonium nitrate solution and ammonia plus small quantities of corrosion inhibitors.

(Continued on Page 123)

Industry's Part *in meeting our* FUNGICIDE Requirements

WE have known since 1,000 B. C. that sulfur has cured certain maladies of plants, but this amounted to little more than a philosophical curiosity until the late 1800's. A chance observation in 1882 that a horrendous mixture of copper sulfate plus lime designed to discourage the pilfering of grapes actually controlled downy mildew led to the discovery of the long famous Bordeaux mixture. The use of inorganic fungicides expanded as our knowledge of parasitism unfolded, and particularly because the chemical industry made plentiful and dependable supplies of these materials available. Over the years several improvements leading to greater effectiveness, lower phytotoxicity, and easier handling resulted. Cuprous oxide was the first of the "fixed" coppers that could be used without lime. It was reported by Horsfall in 1932 as a seed protectant and as a foliage spray. This was followed by the development of several others such as tribasic copper sulfate and copper oxychloride.

Copper and sulfur still are important fungicides because they are produced in volume and are economical. They will remain important so long as their performance is commensurate with their cost and safety.

We would still be back in the days of homemade Bordeaux mixture and crude sulfur were it not for the modern chemical industry. The greatest contribution the chemical industry makes toward meeting our fungicide needs is producing these chemicals in quantity, standardizing their quality, and getting them to the farmer and the gardener at a reasonably low cost.

In the past two decades, we have seen the commercial development of several new organic fungicides as replacements for the inorganic sulfurs and coppers on some of our most important crops and diseases. The farmer today has a choice of a wide variety of fungicides with special types and formulations of each to meet particular crop, disease and application requirements. As a general rule the organics are more specific and effective on certain diseases, and are less toxic to buds, foliage, blossoms and fruits than their inorganic predecessors. Even though the cost per acre treated may be higher with many of the organics, the net return following their use is greater because of the improved disease control, higher yields, and better quality of produce. Twenty-five years ago the farmer had his choice between sulfur and Bordeaux mixture. Stuart in his book, "The Potato," published in 1923, devoted five pages to the procedure for mixing "good" Bordeaux mixture, with precautions on the dire consequences of "bad" Bordeaux. The mixing instructions on most of the modern fungicides are simply stated in one or two short sentences: "Add 2 lbs. of "X" fungicide per 100 gallons of water while the tank is filling with the agitator running." The complicated and critical job of fungicide preparation has been moved from the barrels on the farm to a modern chemical plant, where the entire process is controlled at every step along the way. The home gardener can now purchase a general purpose garden dust or fruit spray mixture containing the correct proportion of several of the new pesticides. The timely and proper use of such a mixture will control all the common diseases, insects and mites, and take the guess work out of home garden pest control.

The earliest entries into the organic field and still the most important from the standpoint of broad range usefulness and volume consumption are the bisdithiocarbamates and the dithiocarbamates. These are organic sulfur compounds and are 5 to 6 times as effective per unit of sulfur as elemental sulfur. For example; two pounds of such a compound containing approximately 15 ounces of sulfur in a complex organic molecule will control many diseases as effectively as six pounds of elemental sulfur or ten pounds of copper sulfate. These organic fungicides conserve our dwindling supplies of sulfur and copper or free them for more critical needs.

The ethylene bisdithiocarbamates have attained the greatest prominence among the organic sulfur compounds. Dithane D-14 (nabam) and Dithane Z-78 (zineb- developed by Rohm & Haas) were the first commercial products of the ethylene bis type. Rohm & Haas flew in the face of 60 years of tradition when it introduced Dithane as a replacement for Bordeaux mixture for the control of late blight of potatoes. Bordeaux was the undisputed champ, and at that time it cost about ½ as much as Dithane. Repeated testing and trials eventually proved that Dithane would control late blight at least as effectively as Bordeaux mixture, do a better job on early blight, have no adverse effect on potato flavor, dry matter or cooking quality, be easier to mix and apply, and of most interest, consistently increase yields by up to 50 bushels or more per acre. Zineb and nabam are now recommended in every state and province of the U. S. and Canada where blight control recommendations are made. Over 80% of the fungicides now used on the potato crop in the United States are of this type of carbamate. Dithane has found uses on many other crops and is gaining a world wide reputation.

By Gordon A. Brandes
Rohm & Haas Co.
Philadelphia, Pa.

***Presented at the meeting of the American Phytopathological Society, December 30, 1955, Atlanta, Ga.**

Ferbam, one of the earliest dithiocarbamates, was developed commercially by du Pont under the name of Fermate. This material found its greatest use on apples for scab, cedar rust and certain other diseases. It was the first "replacement" for sulfur and Bordeaux on apples. Its remarkable effectiveness for cedar apple rust is credited with the saving of millions of red cedar trees throughout the country. The cedar tree is the alternate host for the apple rust and prior to the development of Fermate there was no satisfactory chemical control known. The only control recommended was the destruction of the cedar trees within a one to three mile radius of an apple orchard.

Newer Organic Fungicides

THERE are several other new organic fungicides that have come into more specialized use in the past few years. Most fungicides are applied as protectants before the fungus infection takes place. The phenyl mercury fungicides sold under the trade names of Puratized and TAG 331 and others have found an important place as post-infection eradicants for apple scab. They permit the grower more leeway with his timing in case weather and field conditions interfere with his regular protective spray applications. Crag 341, the glyodin fungicide of Carbide and Carbon, is an excellent low cost protectant for apple scab and cherry leaf spot. Crag is frequently combined with a phenyl mercury to give both eradicative and protective action on apple scab. Captan, discovered by the Standard Oil Co. of New Jersey and Rutgers University, and developed commercially by the California Spray Chemical Corp. and the Stauffer Chemical Co., has proved to be a very effective and safe fungicide for apple scab, peach brown rot, and certain other fruit diseases. It is also a good seed protectant. Captan has been outstanding in producing extremely high quality finish on most apple varieties. The higher quality fruit and consequently higher prices received by growers following the use of this fungicide has resulted in its wide scale adoption by the apple grower.

Karathane is one of the newest organic fungicides to come into general usage. It is rated as the first advance over sulfur yet to be discovered for the control of powdery mildew. Karathane per unit of active ingredient is 20 times as effective for mildew control as sulfur and has a considerable margin of safety on many fruit, vegetable and floral plants. Karathane will also control certain species of spider mites.

Several organic seed treatments such as Arasan, Spergon, Phygon, Captan, Dow 9B, and the phenyl mercuries are effective over a broader range of seed and soil borne pathogens, and are generally safer on a wider variety of crop seeds than the inorganics formerly used. Many of the new seed protectants can be safely applied well in advance of the planting season without damage to the seed or without the loss of their effectiveness in storage. These advantages along with the improvements in automatic seed treating machines have brought about the routine application of seed protectants to over 90% of the seed corn, 70% of the cotton seed, and to an ever increasing proportion of field seeds and vegetable seeds throughout the United States. The farmer and home gardener can now purchase many of his common seeds accurately pretreated with a dependable seed protectant and thus minimize one of the most common fungus losses. Dr. C. S. Reddy of Iowa State College has determined that an investment of 1½ cents per acre in seed treatment for corn has resulted in a net average gain of over 3 bushels per acre in his tests over a period of 16 years. This use of fungicides has resulted in a net gain of over 30 million bushels of corn per year in the state of Iowa. An investment of approximately $100,000 in fungicides has returned over 40 million dollars to the farmers of that state.

It is not the purpose of this report to make a complete review of the history of agricultural fungicides. I have touched only upon a few examples of some of the more important achievements. None of the fungicides in use today has been developed through the single-handed efforts of either industry or the public research agencies. Each has been dependent on the other. It is my primary purpose to discuss industry's contributions in meeting our fungicide requirements. We must recognize at the outset that both industry and the public agencies each have particular, as well as certain joint responsibilities in this regard. Aside from producing and distributing fungicides, industry has assumed the main responsibility for the exploratory work on new fungicides.

Industry's Role in Research

ALL of the organic fungicides mentioned above have one characteristic in common. Every one of them was first synthesized in the research laboratory of a private industrial chemical company. None of them was discovered purely by accident. They were the result of a systematic exploratory program planned to find biologically active compounds. Industry must do this synthesis work, because it has the chemical experience, facilities and personnel required. No other agency—college or governmental—can execute this aspect of the fungicide program as well and at a reasonable cost. Furthermore, if a public agency discovers a new compound, it is likely that it would never be developed under an open public patent because of the high costs involved. Our private patent laws must be maintained and respected, otherwise industry cannot risk the investment in research, developments, plant equipment and promotion required for a commercially successful fungicide.

The initial biological testing of fungicides is usually carried out in the company's own laboratories or in some cases under a research grant with a state experiment station or a private research instiution. The compounds are tested against representative fungi, bacteria, insects, mites, and weeds to "screen" out their potential usefulness. In addition to the general preliminary screening, many companies sponsor special screening projects on particular host or pathogen problems and in such fields as soil fungicides, systemics, and seed treatments. The screening tests are followed by field tests on representative crops at the company's own research farm or their field research stations in different parts of the country.

The promising fungicides must next be tested under a wider variety of climatic conditions and on a broader range of crops and diseases. This is often referred to as the developmental phase and is carried out with the close cooperation of the experiment stations. The manufacturer may already have spent two, three, or more years, and 50 to 100 thousand dollars bringing a new compound along to this stage. Actually he still does not know too much about its commercial possibilities. If, however, the initial testing has been carefully conducted in well designed experiments with suitable checks and standards, we may presume that the results will be reproducible under similar or even different conditions elsewhere. Only by critical tests in a given locality, however, can we really evaluate the worth of a new fungicide on a particular disease or measure its host response. If a compound has been effective against one pathogen, it is a fairly safe assumption that it will have some activity against others and should be tried. In many cases a compound may demonstrate a remarkable specificity for a certain type of pathogen which was completely overlooked in the preliminary testing. A case in point is the discovery several years after its introduction that Karathane was a better control for powdery mildew than it was for apple scab or potato blight.

Most research workers in experiment stations at one time or another have had a bright young man stop in and announce, "We have a promising fungicide in the laboratory, doctor." Your first reaction may be, "Go away, I have too many promising fungicides to test now."

Some experiment station administrators or plant pathology department heads have said their institutions have become nothing but a testing ground for industry, and this work cannot be carried on without additional financial support. Industrial research directors are reluctant to establish a grant-in-aid for every last test to be conducted with a new or an established fungicide. Both sides obviously have a problem. Industry must have the intensive as well as the extensive field testing conducted before it can offer a new product for sale. The extension worker must know what the product will do in his area before he can recommend it to growers.

I believe there are a lot of man hours wasted every year on the business end of a spray gun by professional plant pathologists in the routine and repetitious testing of fungicides. Likewise, there are thousands of dollars worth of samples wasted in poorly designed, improperly controlled, and inadequately applied fungicide trials. There is always the outside chance that the unexpected may show up in a so-called "screwball" experiment. Such departures from the norm should by no means be discouraged. However, neither industry nor the experiment stations can afford the high cost of fungicide experiments that are not calculated to produce meaningful results. Neither a moratorium on new fungicides nor an increase in grant-in-aid funds offers any real or desirable solution to this problem. I think it would be helpful to explore the possibilities suggested by some that a staff technician level be established at more of the experiment stations to carry out the routine procedures of fungicide application and data collecting. This would be done under the direction of a professional staff member but would free him for more creative and fundamental pursuits. We can probably do a better job of conducting and coordinating our field tests on an area or a regional basis. I have always been amazed how frequently the effectiveness or acceptability of a particular fungicide has been altered at a state boundary. I don't believe the fungicide, the pathogen, nor the crop has the slightest idea where the state boundary is located, nor does it care.

The technical development man employed by industry serves a very important function in coordinating the work among the various states. He travels from one experiment station to another and to the various growing areas in all parts of the country, observing and discussing results of fungicide trials. He can see at first hand how his product is performing and is in the best position to make suggestions and recommendations for further trials on dosage, timing, compatibility, varieties, and even other crops and diseases. Once the promise of a new compound is recognized, the development man will accelerate the testing program by initiating a series of semi-commercial or commercial trials with growers. These tests are usually carefully supervised and are often carried out in cooperation with the local experiment station or extension pathologist. They add tremendously to our overall knowledge on a new compound. This cooperative effort can go a long way in distributing the load between industry and the experiment station in the final evaluation of a new fungicide. Dithane was tested as a soil treatment for cotton seedling diseases on about 13,000 acres of commercial cotton in California and Arizona in 1955, and carbamates were used commercially for wheat rust control in North Dakota the same year largely by such an effort.

LAWS safeguarding the food supply have been in existence in the United States for over half a century. There are no new concepts of basic law in the latest amendment Public Law 406 or the so-called "Miller Bill" passed in 1954. The Miller Bill prescribes a less cumbersome procedure for the establishment of pesticide tolerances on food crops and provides a means for appealing decisions before a court or other referee as promptly as possible. The passage of this amendment was strongly endorsed by both industry and the public agricultural research agencies. The grower, the manufacturer and the public agency needed to have their position and responsibilities clearly defined. We are confident that this will be worked out to the best interests of all concerned.

Most fungicides are sold in interstate commerce and are, therefore, subject to the federal laws governing economic poisons and the Food and Drug laws covering raw agricultural commodities. Before a product can be sold interstate the label must be registered with the U. S. D. A. and the performance claims substantiated with reliable data accumulated in carefully conducted tests. When the accepted uses of the product result in no residue on a food crop at harvest time, or if the accepted use is on a non-food crop, obviously no tolerance is needed. If a residue is likely to result from the accepted uses of this product on food crops, then the manufacturer must petition the Food and Drug Administration for a safe residue tolerance as provided in the "Miller Bill." The usefulness of such a product is certified by the Secretary of Agriculture to the Food and Drug Administration, who in turn carefully review the detailed toxicological data on the product and the residue data resulting for the uses claimed. From the assembled facts the Food and Drug Administration will then establish a safe tolerance level for this pesticide and the U. S. D. A. will accept and register labels with claims for uses that are not likely to result in residues in excess of the established tolerance.

The manufacturer, because of his legal obligations as the seller and for moral reasons, must assure himself that his product is not unduly hazardous to use, or its use will not result in any harmful residues to the consumer of treated crops. Before a new fungicide goes very far even as an experimental compound, some preliminary evaluation of its mammalian toxicity must be made. This is necessary to protect investigators as well as personnel engaged in manufacture and formulation. If the material shows promise for commercial development, it then becomes necessary to obtain the complete toxicological evaluation of the material, including its chronic toxicity, vapor hazard, skin irritation, etc. The cost of this work is underwritten completely by the manufacturer, but the work usually is conducted in outside independent laboratories set up primarily for investigations of this kind.

It is necessary for the manufacturer to develop accurate and specific analytical methods for a new compound, so the level of residues remaining on treated food crops can be measured and so the product may be assayed during production and by pesticide regulatory officials. The industrial laboratory again is the logical place for this chemical work to be done because of its chemical "know-how" and familiarity with the product.

The initial residue determinations on food crops are made in the laboratories of the manufacturer or through a special grant arrangement with certain local experiment stations. With the new emphasis on pesticide residues in food crops, this question becomes increasingly important. It has been estimated by one industry official that the new Miller legislation will add an extra 50 to 100 thousand dollars expense to the cost of developing a commercial pesticide. We believe it will be important that the state experiment stations now give more attention to the residue picture on the crops grown in their local area under their particular local climatic conditions. In many cases this will necessitate the establishment of residue analytical laboratories at the local experiment station level, and the establishment of special experiments so designed to yield complete residue information as affected by dosage, timing, and combinations with other spray materials. Biological data from a particular test is no longer considered a complete and adequate report. Residues remaining under varied conditions of use must also be determined.

We will certainly have to encourage cooperative efforts between states in accumulating pesticide residue data. It is understandable that a different residue picture may result with the same fungicide on the same variety of apples in the arid Yakima Valley as compared to the humid Shenandoah. But I doubt if there will be much difference between Yakima, Washington and Hood River, Oregon or between Winchester, Virginia and Biglerville, Pennsylvania.

One thing is obvious. Forty-eight separate states cannot afford to collect the performance data and the

(Continued on Page 137)

NEMAGON

(1, 2-dibromo-3-chloropropane)

Cotton treated with Nemagon soil fumigant, right, clearly shows better plant and boll development due to nematode-free roots. Photo was taken near Bakersfield, California, in 1956.

By Dr. C. C. Compton and Dr. S. H. Benedict

Shell Chemical Corporation
New York, N. Y.

WHILE nematologists have been uncovering more and more crop destruction that is directly attributable to nematodes; farmers, state and federal research workers, and the agricultural chemicals industry have been intensifying their search for more efficient, economical and easier ways to control the microscopic worms.

Many methods of nematode control have been tried in recent years. Among them have been nematode-resistant crops, early harvests, crop rotation, trap crops (*crotalaria spectabilis*, for example), nematode-destroying fungi, biological control, burning-off infested areas — only heaven and the nematode knows what hasn't been tried. But we still have nematodes, and the only effective control to date is based on soil fumigation.

Since 1945, a soil fumigant, marketed under the registered trademark D-D, has been used almost exclusively on citrus and pineapples; D-D, ethylene dibromide and chloropicrin have been used effectively as pre-plant treatments on tobacco, tomatoes, sugar beets, celery, carrots and other crops. While these chemicals have been performing with dramatic success, the search for an even better nematocide has gone ahead.

One of the most promising fumigants to come out of this search bears the trademark "Nemagon," and is a product of Shell Chemical Corporation. Where it has been applied, it has often shown startling success and naturally it has aroused a good deal of interest. The purpose of this report is to bring Nemagon's performance record up-to-date so there will be a better understanding of its capabilities and its limitations.

Advantages of Nemagon

WHY has Nemagon excited so much interest? Largely it is due to the many advantages it has shown over previous nematocides. (1) It has been applied to certain established plants without harm. (2) It has been successfully prepared in granular formulations and can be combined with fertilizers. (3) It is economical. Its price per acre of application compares favorably with other fumigants. (4) There is no off-flavor problem connected with its use. (5) For the formulator it is worth noting that Nemagon is an easy chemical to formulate. (6) For the consumer it offers an easy-to-use nematocide that can be applied to such diverse plants as cotton, cantaloupes and home lawns. (7) Because of Nemagon's low vapor pressure, plus its high density, there is little tendency for the vapors to be lost to air from the soil surface. (8) Nemagon is effective. Applied either as granules or a liquid, it has given a high degree of nematode control, and available data indicate it is effective on a wide variety of nematode species.

Limitations of Nemagon

THE development of Nemagon represents a major advance in the field of nematode control, but the chemical does have to be used with an understanding of certain restrictions. Specifically it has been found that

a soil fumigant

California grapes suffering from decline were treated with Nemagon in 1955. Although final results have not been revealed, it is clear that the fumigant did not harm the living plant.

tobacco, onions, garlic, and a limited number of other crops are sensitive to Nemagon. For example, results on several test plots rule it out as a pre-plant treatment for tobacco.

As far as its mammalian toxicity is concerned, Nemagon ranks with other nematocides. The liquid or vapors can be harmful if proper precautions are not observed, however, when used according to label instructions, it offers no unusual hazard.

How is Nemagon Applied?

AS a liquid, Nemagon is injected into the soil with the same type of equipment used to apply other liquid soil fumigants. For row treatment, dosages range from 0.5 gallons per acre to 2.5 gallons per acre. For broadcast treatments, dosages range from 1.25 gallons per acre to 10 gallons per acre of technical material.

For application to such living crops as citrus, peaches, grapes, strawberries, lawns, and certain ornamental plants, it is applied at dosages ranging from 2½ gallons to 10 gallons per acre, depending on plant tolerance. When applied to established trees, it is injected into the soil to a depth of 6"-12".

One of its more promising uses has been demonstrated in Florida where the nematode problem on home lawns is acute. An emulsion of the fumigant has been applied successfully to established lawns and at a cost homeowners can afford. Following treatment, the chemical was drenched in with a heavy application of water. In a few weeks time the lawn had regained its vigor.

Nemagon Applied to Living Plants

IT is still too early to determine the full use to which Nemagon can be applied to established crops. Tests in 1954 and 1955 on a number of tree and vine crops showed apparent nematode control with little or no phytotoxicity. Evidence of the promise it holds for living plants has been reported by Dr. Roy Hansberry, manager of Modesto Agricultural Laboratories, Shell Development Company, as follows: "Nematode-infested peach trees were planted into soil treated with Nemagon soil fumigation just before planting along with untreated controls. At the end of the first year, the untreated trees had attained a height of about three feet and showed typical nematode injury. The Nemagon-treated trees, however, had reached a height of five feet and were generally more vigorous than the untreated trees. This indicates that post-planting treatment of nematode-infested trees may hold promise. Observations of other post-planting treatments now in progress will show us how far we can expect to go with Nemagon applied to living trees."

Granules Containing Nemagon

THE application of granules containing Nemagon has a broad appeal to formulators, experiment station workers, nematologists, and commercial growers because of their ease of formulation and application. Granular formulations will be particularly in demand for pre-plant use on home lawns and gardens as well as for general farm applications.

Nemagon soil fumigant has been applied to "Attaclay" and vermiculite granules and certain fertilizer mixtures. With suitable equipment there appears to be no problem of formulation within the holding capacity of the carrier. Certain precautions, however, appear to be in order when it comes to packaging to assure stability.

Although it is possible to apply Nemagon fertilizer mixtures (100-200 lb./acre) with regular fertilizer equip-

(Continued on Page 125)

Midwest Soil Improvement

AGRONOMISTS from 13 Corn Belt agricultural colleges, representatives of the fertilizer industry and manufacturers of fertilizer application equipment discussed mutual problems at the eighth annual joint conference of the Middle West Soil Improvement Committee in Chicago Feb. 16 and 17. Registration at the Edgewater Beach Hotel was close to the 600 mark.

Keynoting the varied program was the declaration by Russell Coleman, executive vice president of the National Plant Food Institute that "Fertilizer is the farmer's best buy." Other highlights included discussions on fertilizer-insecticide mixtures, reports on recent research projects at four state experiment stations, an account of the application of electronics to a farmer's business, a review on how farm people accept new ideas, and a session on fertilizer mechanization.

Dr. J. W. Apple, entomologist, Univ. of Wisconsin, reported that more than 200,000 tons of fertilizer-insecticide mixtures were used on American farms last year. "Midwest farmers," he said, used the mixture on about 1,000,000 acres of corn land to help control rootworms, wireworms and other pests.

Reviewing 1955 Wisconsin tests, Dr. Apple said insecticides added to starter fertilizers to control rootworm infestations increased yields as much as 39 bushels per acre, while lodging was reduced about 90 percent. Heptachlor, aldrin and chlordane in varying amounts were used in such fertilizers as 5-20-20 and 4-16-16, to provide concentrations of ¼ to 1 lb. per acre. He referred to Iowa tests indicating that aldrin and chlordane in starter fertilizer reduced rootworms 87 percent and increased yields 28 percent.

Next to rootworms, control of wireworms is a most important problem on middle west farms, reported Dr. Apple. In addition to corn, wireworms attack small grains, potatoes, lima beans and other crops. He told of Wisconsin tests, using 2 lbs. aldrin per acre in fertilizer to combat wireworms on lima beans. Plant survival was increased by 145 percent. Half a pound of aldrin increased survival by 114 percent and similar results were obtained with heptachlor.

Fertilizers, whether spread broadcast or used as a starter, Dr. Apple declared, can provide an excellent carrier for insecticides, and the ultimate use of insecticides in fertilizer is governed only by the total sale of all fertilizer. Future research, he added, may provide a means for controlling nematodes.

Victor C. Smith, field engineer, Velsicol Chemical Corp., Chicago, expressed disappointment in that some fertilizer manufacturers are not showing the interest in production of insecticide-fertilizer mixtures that this development warrants. He quoted statements by different industry men who explained that they are not entering this field because of uncertainty that the practice is here to stay.

Mr. Smith cited USDA figures showing the constantly growing use of the F-P mixtures, and said that in all probability this usage will continue to expand and that the industry will be called on to meet this demand. He emphasized that it would be much to the manufacturer's advantage to install production equipment now, and when new pesticides enter the market they will be fully prepared to handle the demand for F-P combinations.

In his report on "Improved Methods of Insecticide Application to Fertilizer" Mr. Smith used flow charts and diagrams to describe new methods and equipment for adding insecticides to fertilizer. Continuing his appeal for more interest on the part of manufacturers, Mr. Smith declared that the increasing demand for fertilizer-insecticide mixtures by the farmers "is not just happenstance." Farmers are learning, he said, (1) that soil insecticides applied with fertilizer are providing almost perfect control of soil insects; (2) use of the mixtures saves time before spring planting when every hour is critical; (3) an estimated $1.40 per acre is saved by applying the combination in one operation; and (4) this one application operation helps farmers who wish to take advantage of winter soil conditions by working the soil a minimum number of times.

Spectacular results from use of fertilizer on one of the world-famous "Morrow Plots" at the Univ. of Illinois were described by Dr. L. T. Kurtz, professor of soil fertility. These plots have been cropped continuously to corn for some 60 years, each plot being subjected to varying management practices. One plot had received fertilizer or the return of crop residues to the soil from the beginning of the project over half a century ago.

Last season, however, a heavy fertilizer treatment was made in a strip across this almost sterile plot. Corn yield, Dr. Kurtz said, was boosted 50 bushels per acre and almost equalled yields on the best plots in the Morrow area that had been farmed under good management methods over the years.

Discussing other research by Illinois agronomists, Dr. Kurtz expressed the view that there is little difference in crop results between fall and spring application of nitrogen fertilizer. Various forms of nitrogen appear to be almost equally effective when applied to wheat, but under some weather conditions the difference in form will be a factor. No differences were found in effects of nitrogen in various forms on corn, but there was an appreciable difference between fall and winter application. Analysis of trace elements in crop samples of ing that while the cost of all farm production items has risen 125 per cent since 1935, the cost of plant food has risen only 13 per cent. Fertilizer today has more crop building power, he said, . . . the increased concentrations of plant food used per ton of fertilizer being almost 23 percent.

For the immediate future, he suggested that research "know-how" must be sold to farmers on the basis of dollar returns. "Responsible people in government — even in Congress, state that research is responsible for present agricultural surpluses. How ridiculous this sounds, he continued, "to those who know that only through the application of research can farmers possibly stay in business. Yet for the protection of our agricultural research program, we must convince those who hold the purse strings. Admittedly, this requires a sales effort by the Land Grant colleges. In many states you already have the information to do this sales job."

In presenting a review of an extensive Iowa study on "How Farm People Accept New Ideas," two Iowa State College rural sociologists, Joseph M. Bohlen and George M. Beal, explained that agricultural leaders are concerned with narrowing the time gap between early and late adoption of recommended practices.

People go through five stages in learning about and adopting new ideas and improved practices, the study brought out. Adoption of hybrid seed corn in Iowa took seven years but adoption of most other hybrid seeds has come more rapidly, two social scientists said. Changes involving new skills and techniques usually require more time, they added.

As in previous years, state agronomists offered "suggested minimum fertilizer grade needs of the middle west" for the year beginning July 1, 1956. This annual report has always been of great help to manufacturers in planning their production and sales programs in the areas they serve in the various midwest states.

The final session, devoted to fertilizer mechanization, was a new feature of these joint conferences, whose

(*Continued on Page* 102D)

Committee...Feb. 16-17

features discussions on F-P mixtures; state research results; mechanization

By H. H. Slawson
Chicago Correspondent

corn and soybean plants on a wide variety of soils indicate that no shortages of these elements are yet apparent in Illinois, although in some locations soybean plants appear to be low in either manganese or boron.

Burley tobacco yields were boosted by 760 lbs. per acre and crop value increased to $410 per acre in Kentucky tests when nitrogen was added to a basic potash application, and barley and vetch were grown as a winter cover crop on soils high in phosphates, Dr. Wm. A. Seay, Univ. of Kentucky agronomist, reported. He discussed also results on varied uses of fertilizer on tobacco crops. For high yields and high quality, burley tobacco needs a much larger supply of nutrients from the soil than does corn, he said. Attention should be given also to fertilization for a quality product, he suggested.

Adequate fertilization for corn in Nebraska means supplying enough nitrogen fertilizer, declared Dr. Harold F. Rhoades, Univ. of Nebraska agronomist, in reporting on recent research in the Cornhusker state. In some cases, phosphate is needed in addition to nitrogen, and in a few instances a complete mixture of nitrogen, phosphate and potash is required.

In Nebraska's damaging 1955 dry season, Dr. Rhoades said, irrigation gave 60 bushel per acre corn yields, while non-irrigated fields averaged only 9 bushels per acre.

Fourth of the reports on recent state research projects, by Dr. A. C. Caldwell, Univ. of Minnesota soils specialist, dealt with use of radioactive phosphorus to determine how much of the nutrients in a plant come from fertilizer, and how much is supplied by the soil. Other tests measure the residual or "carry over" amount of phosphorus remaining in the soil after harvesting a crop.

Use of the famous Univ. of Illinois "Illiac" electronic computer to plan a farm business was described by Dr. Earl R. Swanson, assistant professor of farm management at the Illinois institution. Into the "electronic brain" were fed various factors, such as the farmer's starting capital, his additional borrowed funds, cropping acreage and pattern, various levels of fertilizer application, etc., and in 20 minutes out came the answer, telling the farmer what to do to obtain a given annual income.

Most farmers, Dr. Swanson, said, lack the detailed information for a thorough job of advance programming of their operations. The "electronic brain," does, however, aid in fitting the individual enterprise and practices into the total farm business. Since the computer permits consideration of so many factors, it allows land grant college specialists to make better recommendations in guiding farmers in their operations.

In his talk on "The Changing Fertilizer Picture and Its Implications," Russell Coleman of the NPFI emphasized that "fertilizer is the farmer's best buy," with figures show-

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San Antonio, Texas (American Lithium Chemicals, Inc.)

Export Division • 99 Park Avenue, New York 16, New York

Nitrogen Solutions

By Howard R. Lathrope
Nitrogen Division
Allied Chemical & Dye Corp.
Indianapolis, Ind.

H. R. Lathrope pouring Uran 32, which offers no odor problem, and involves no nitrogen loss.

NITROGEN solutions have shown a tremendous increase in popularity and a wide growth in use since they came onto the midwest market about five years ago. They are safe and easy to handle, and they are effective and low in price. They can be tailor made to suit a particular crop, and by virtue of their form lend themselves to speedy and easy application.

Because they supply nitrogen in a form which is made rapidly and directly available to a growing crop, they offer the quick, visual proof of effectiveness which stimulates resales. Many of the more successful distributors who have taken up the sale of these new products over the past few years have familiarized themselves with crop responses to nitrogen in this readily available form, and they have developed into excellent salesmen of these new type nitrogen fertilizers. It is now possible for a farmer to apply or to have nitrogen applied to his land for as little as 12 cents or less per pound of actual nitrogen. Nitrogen solutions are equally as effective as solid nitrogen, and often more so. In fact, when solutions are correctly applied, and comparisons are later made with plots that have had nitrogen in the conventional solid form, it is impossible to detect any difference in response.

Ease of application, as well as rapidity of response, has been an important sales stimulant. Many farmers have applied 150 lbs. of actual nitrogen per acre to 250 acres per day, with nothing to lift except the end of a two inch hose when filling the applicator tank. More than 100 acres of wheat were top dressed per hour on the Chas Schenk farm, Vincennes, Indiana four years ago using aerial application. Fourteen old Willard Deno of Fowler, Indiana top dressed 100 acres of wheat in an afternoon, and Bernard Wagner of Chandler, Indiana, prior to plowing, applied 150 lbs of actual nitrogen to corn stalks on 50 acres of land after five-O-clock in an afternoon.

Five years ago, when nitrogen solutions were first introduced in the mid-west, satisfactory applicators had not yet been developed to apply the material. Stainless steel and aluminum were difficult to obtain, and much trouble was encountered with corrosion problems. Today, there are more than a dozen different types of applicators on the market which can apply nitrogen solutions without corrosion or other difficulty.

Nitrogen solutions are of two forms: the "no pressure" solutions and the "low pressure" solutions. The "no pressure" solution, which Nitrogen Division markets under the name "Uran 32," is a combination of nitrate and urea nitrogen, which makes the solution quick acting as well as long lasting. This solution is odorless, and since it contains no ammonia, there is no loss of nitrogen when it is exposed to the air or sprayed on the surface of the soil. This characteristic makes this material ideal for application as a top dressing for small grains, for pasture, and for spraying on corn or wheat stubble prior to plowing under to get quick decomposition of residues.

Farmers who plow down residues that have been sprayed with "Uran 32" do not plow up the residues the next season. With 32 to 40 foot spray booms on applicators or on airplanes, "Uran 32" can be applied as a top dressing for small grains or pastures at a very rapid rate.

The "low pressure" solutions, which our company markets under the "Nitrana" trademark, have a pressure of from 1 to 48 pounds, and vary from 37 percent to 49 percent nitrogen. These solutions are combinations of nitrate nitrogen and anhydrous ammonia. Because of their low pressure, these solutions are most effective when injected beneath the surface of the soil. Many farmers have devised equipment to apply these low pressure solutions by gravity feed from a tractor mounted tank, and ordinary garden hose running back to the soil as it is turned. Commercial equipment is available in any one of a dozen different type applicators for injecting these solutions four to six inches beneath the surface of the soil.

Because of their low pressure, farmers do not experience difficulty with these solutions escaping from the soil, if they are applied when soil is very dry or when slightly moist. Packing wheels and skilled operators are not necessary. Nitrogen solutions have taken the back aches out of part of the farmer's job. Pumps, motors and brains have replaced muscle and brawn to the complete satisfaction of many thousands of farmers from New York to Wyoming.

Nitrogen solution storage tanks are to be found in about every county in the corn belt, and solutions are now "riding the range" in Colorado, Wyoming and the Dakotas. One test plot, consisting of more than 1,000 acres of native grasses received an application in Western Nebraska early last spring using a 40 foot boom for the application of "Uran 32". Yields were increased, carrying capacity improved, and a very profitable increase in the protein content of the grasses was observed. Because "Uran 32" is compatible with 2,4-D, aldrin, and many other insecticides, two or three jobs can be done in one application, with increased efficiency.

Perhaps the largest use of the low pressure solutions is for preplant or side dressing corn. Plots on the Herb Roadruck farm at Brookston, Indiana, which were treated with "Nitrana" applied in the fall, showed yields of corn totaling 185 bu. when 288-144-144 was applied and plowed down.

Besides improvement in the application equipment, there has been a great improvement in storage tank location, so that in the spring of 1956 farmers will have adequate supplies of nitrogen solutions close by for every farm in the midwest. Chains of nitrogen stations are to be found in many sections of the nation. Of course, following these nitrogen solution chains, will come the suppliers of phosphorus and potash, because nitrogen helps to increase yields, making it essential that crop nutrients be replaced.

Since the days of Squanto in 1620, when he served as the first agronomist, planting a fish under every hill of corn, men have been dissatisfied with their corn yields. There are still many thousands of farmers who do not apply enough nitrogen in any form to prevent their corn and wheat crops from firing and showing visible symptoms of nitrogen starvation. More than 50 percent of all midwestern farms will show "firing" or lack of nitrogen at tasselling time. When corn fires, yields are held down. It is like closing a factory at 2:30 in the afternoon for lack of materials.

In the future we may have fewer acres of corn, but most assuredly we will have more profit per acre and with less work when nitrogen solutions are used as a source of nitrogen. Some corn and wheat acres will likely be growing grass, and since we are a meat eating nation there will always be a great need for nitrogen because pastures will be hungry for nitrogen.

Nitrogen solutions offer the most efficient way to feed soil microbes, to take advantage of their important function in improving soil tilth. Most beneficial soil microbes prefer the ammonia forms of nitrogen such as are found to a large degree in nitrogen solutions. Soils low in nitrogen and organic matter are low in soil life. Soil life is necessary, otherwise we would be smothered with crop residues. Feeding the soil microbes may open up a whole new concept in our soils and fertility program, as nitrogen solutions offer the best way to apply nitrogen to feed these soil bugs. ★★

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Fertilizer Permits in Nebraska

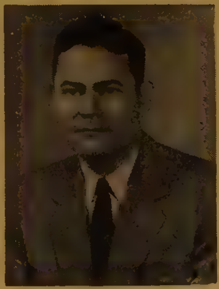
John D. Clayton, chairman of the Nebraska Pharmaceutical Association legislative committee, reported in late January that the Department of Agriculture and Inspection is calling upon pharmacies to determine whether each one offering fertilizer for sale has a license to sell it. An inspection fee not to exceed 10¢ per ton, is to be paid for all commercial fertilizer sold.

LISTENING Post

D-D Fumigation of Soil for Control of Parasitic Nematodes

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller



A. C. Goheen, of the Horticultural Crops Research Branch, United States Agricultural Research Service, has furnished a preliminary report on beneficial results from soil fumigation of strawberries in studies conducted from 1953 to 1955 at Beltsville, Maryland.

A clay loam in which strawberry nematodes were known to be present was selected for the fumigation plots. Prior to the experiment strawberry plants heavily infected with meadow nematodes, *Pratylenchus pratensis* and *P. penetrans*, and to a less extent with the northern root-knot nematode, *Meloidogyne hapla*, had grown on this soil. A few lance nematodes, *Hoplolaimus* sp., were present.

The fumigant used was D-D applied once at the rate of 30 gallons per acre with a hand injector at intervals of 1 foot each way. It was applied on April 24, 1953, after the field had been fertilized and fitted.

Nematode-free and nematode-infected Aroma and Blakemore strawberry mother plants were used; the nematode-free plants from stocks growing in methyl bromide-treated soil in a greenhouse, and the nematode-infected ones from nematode-infected stocks growing in a nearby field. All plants necessary for the experiment were dug the same day in early April and held at 32° F in polyethylene bags.

Nematode-infected mother plants of each variety were set in plots of fumigated and of non-fumigated soil. Nematode-free plants of each variety were set in plots of fumigated soil. The plots were 7 by 16 feet with 4 mother plants spaced in the center of each so that a bed of plants 12 feet long by approximately 2 feet wide was formed for yield tests. The plots were arranged in randomized blocks and replicated 5 times. The mother plants were set on June 2, or 39 days after fumigation, to allow ample time for the fumigant to escape.

The plants in the plots were rated for growth, yield, and nematode population. Growth was rated at intervals during the first year. Yield data were obtained in 1954 and 1955. Nematode populations of the plant roots were determined several times during the course of the study.

All mother plants survived. In some plots, the plants appeared slightly better than in others during the first year, but no consistent growth differences resulted from treatment. Likewise, at the end of the 1954 fruiting season no great growth differences were apparent. At the end of the 1955 fruiting season, however, the plants in the fumigated plots, whether they were from nematode-free or nematode-infected mother plants, appeared much better than the plants in the non-fumigated plots.

Yield of fruit in the 1954 season roughly corresponded to the appearance of the plants in the plots. No significant differences were found. However, during the 1955 season yields showed marked differences as a result of soil fumigation. Blakemore yielded more fruit than aroma, but the varieties responded similarly to soil fumigation. In fumigated soil, nematode free plants yielded slightly more than nematode-infected plants and the latter in turn yielded 20 per cent more than nematode-infected plants in non-fumigated soil (Table 1). Yield differences between plants in fumigated and non-fumigated soil were highly significant, but those between nematode-free and nematode-infected mother plants set in fumigated soil were not significant. Soil fumigation had no effect on berry size either year.

Nematode populations in the plant roots did not show any consistent differences during the first year, when in general there were very few nematodes. By the end of the 1954 fruiting season meadow nematodes, however, had become established in the plants in all plots. Plant roots in fumigated plots contained significantly fewer nematodes than

TABLE 1.

Meadow nematode population and mean yield of fruit of 2 strawberry varieties in D-D fumigation plots at Beltsville, Maryland, 1953-55

Mother plants	Soil treatment (1953)		Nematodes per gram of roots (June 1954)	Yield per plot (1955)
	Fumigant	Rate per acre Gal.	No.	Kg.
Nematode-free	D-D	30	350	10.94
Nematode-infected	D-D	30	270	10.31
Nematode-infected	—	—	1,092	8.57
L.S.D.				
5%			690	1.66
5%			942	2.26

those in non-fumigated (Table 1). By the end of the 1955 fruiting season, approximately equal populations of meadow nematodes had built up in the plants in fumigated and non-fumigated plots. Root-knot nematode galls were found on some of the plants and a few lance nematodes were found in the soil of some of the plots at the end of both fruiting years.

This experiment demonstrated the value of soil fumigation with D-D to control parasitic nematodes in strawberry plantings on heavy soil even where nematode-infected mother plants were used. Where nematodes build up rapidly, as in sandy soils, the value of soil fumigation might be much greater and nematode-free mother plants might be worth while.

3,p-chlorophenyl-5Methyl Rhodanine as a Soil Amendment[1]

A. C. Tarjan, of the Rhode Island Agricultural Experiment Station, writes that the meadow or root-lesion nematodes, *Pratylenchus* spp., have lately acquired a notoriety that promises to equal that of the root-knot nematode. The fact that colonies of the nematodes establish themselves in the cortical tissues of the roots makes control of these pathogens with chemotherapeutants particularly difficult. Recent work indicates that infected plants may be treated by immersion in water at 124°F. for 5 minutes. Treated stock should then be planted in sites previously treated with soil fumigants.

Various tests have been reported indicating the therapeutic efficacy of 3-p-chlorophenyl-5-methyl rhodanine (hereafter referred to as N-244) against root-knot nematode infections. When a strawberry field, planted a few months previously for investigation of varietal yield, was discovered to be naturally infected mainly with meadow nemas, *Pratylenchus penetrans*, an experiment was instituted in July 1954 to test the nematocidal effect of the chemical when used as a soil amendment.

N-244 at the rates of 500, 300, 100 and 0 lbs. per acre was applied to rows 20 ft. long in a systematic arrangement. The experimental area consisted of single rows of Catskill and Sparkle and two alternating rows of Howard 17 variety strawberries. The correct amount of chemical in powder form was incorporated into a small quantity of sand, distributed evenly within an area extending 1 ft. from the base of the plants on each of the rows, and hoed into the soil to a depth of 4 to 6 inches.

No injury to plants was observed as a result of treatment. Data obtained the following season showed that treatment with N-244 at rates of 500 and 300 lbs. per acre resulted in a higher yield of marketable berries than the lower treatment rates (Table 2).

TABLE 2.
The effect of N-244 as a soil amendment on total yield in quarts of strawberries

Treatment	Strawberry Varieties[a] Catskill	Howard 17 Row B	Sparkle	Howard 17 Row D	Total yield per treatment[b]	Av. yield per picking[b]
N-244 at 500 lbs./acre	27.0	22.0	44.5	18.0	111.5	10.0
N-244 at 300 lbs./acre	32.0	15.0	43.5	22.0	112.5	10.0
N-244 at 100 lbs./acre	26.5	20.0	27.5	23.5	97.5	9.0
Untreated Controls	24.0	14.0	32.5	19.5	90.0	8.0
Variety yield total[b]	109.5	71.0	148.0	83.0		
Av. yield per picking	10.0	6.5	13.5	7.5		

[a] Yield per 20 ft. row
[b] Yield per 80 ft. row

TABLE 3.
The effect of N-244 as a soil amendment on the approximate number of plant-parasitic nematodes present in a pint soil sample

Treatment	Catskill	Howard 17-Row B	Sparkle	Howard 17-Row D	Average
N-244 at 500 lbs./acre	1700	2600	500	500	1325
N-244 at 300 lbs./acre	2900	2300	300	400	1475
N-244 at 100 lbs./acre	1900	2000	100	3300	1825
Untreated Controls	3900	8900	700	1400	3725

Berries from all treated plots were tasted during harvesting and judged to be free from "off-flavors".

After yield data were obtained, soil from three locations within each treated row was combined, thoroughly mixed, and placed in a pint sample jar. The pH of these soil samples was found to be from 5.1 to 6.2 with no significant differences between treatments. Each pint sample of soil was processed through various sized sieves and the residues were put in the Baermann funnel for 24 hours. The following day the liquid contents of each funnel were passed through the Buechner funnel. Residues retained in this method were suspended in water, made up to 100 ml. volume with water, and the numbers of plant-parasitic and saprobic nematodes were determined from aliquots and calculated to represent the approximate total numbers present in the samples. Since counts of plant-parasitic nematodes bore the same relationship between treatments as did counts of both the saprobic and total nematode populations, only these are presented in Table 3. Here it can be seen that the average number of plant-parasitic nematodes was reduced as a result of soil treatment. Also worthy of note is the lower number of nematodes present in the Sparkle variety as compared to other varieties.

The most prevalent plant parasite present was *Pratylenchus penetrans*. Other parasitic and suspected parasitic nematodes observed were nemas belonging to the genera *Tylenchus, Aphelenchoides, Paratylenchus, Psilenchus, Xiphinema,* and *Rotylenchus*.

The results indicate that treatment with N-244 can increase yield appreciably and reduce the number of nematodes in the soil around the roots. Although an inspection of Table 2 shows that the difference in total yield between the untreated controls and N-244 at 300 lbs. per acre is only 22 quarts, it should be remembered that this represents the increase in yield of only 80 ft. of plant row space. Such an increase in yield in any extensive commercial planting would represent a considerable margin of profit over the cost of treatment which amounts to about 1¼ lbs. of chemical per 100 feet of row. These data are the result of one year's tests.

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[1] Contribution No. 871 of the Rhode Island Agricultural Experiment Station, Kingston.

Livestock Pests of Concern; Potato, Truck Crop Pests Spreading

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

DURING the first two months of 1956 livestock pests were of concern in many widely-scattered areas. In Oklahoma, cattle grub counts averaged 25 per animal in Harper county, 9 per animal in Canadian and Payne Counties and 22 per animal in Osage county during January. By the middle of February, however, the infestations in some areas of this state were rapidly declining, as inspections at meat packing establishments in Oklahoma City showed an average of about 3 grubs per animal. A survey in six counties in Arkansas in mid-January showed an average of 8 grubs per animal, and at this time, Maryland reported an average of 4 grubs per infested animal in Montgomery county, and Kansas had 4 per animal in Johnson county. Other states experiencing some trouble with these insects during late January and early February included Texas, where infestations were heavier than normal on cattle in Madison county; North Carolina, which had some light infestations; Virginia, where infestations were light to medium at Blacksburg and medium to heavy on the eastern shore; and Utah, which had widespread infestations.

Cattle lice were also a problem in some states. The infestations in Kane and Iron counties, Utah, were serious during late January, and were becoming serious in many additional counties by early February. In Wasatch county, however, cattle dipped or sprayed during the fall of 1955 were found to be relatively free of lice. Infestations in Arkansas were generally light, but some heavy infestations were noted. Herds in western Cass county, North Dakota, were found to be 33 percent infested, with infestations ranging from light to medium. Virginia reported heavy infestations on beef cattle at Blacksburg around the middle of February.

Spotted Alfalfa Aphid Infestations

ALTHOUGH the spotted alfalfa aphid was not causing general widespread damage on alfalfa in the early weeks of 1956, light to damaging infestations were reported from California to Arkansas. Light infestations occurred in Imperial, Alameda and San Joaquin counties, California, in late January and high populations were widespread in Kings county where 4,870 acres were sprayed. Moderate infestations were found in parts of San Diego county. In Arizona, scattered heavily-infested alfalfa fields were reported in the Yuma area and the Salt River Valley in late January, but the overall infestations in this State were lighter than at the same time in 1955. Light to medium populations infested alfalfa in Denton, Grayson, Fannin, Hunt, Navarro, Brazos and Burleson counties, Texas, and the aphid was numerous in alfalfa in Millard county, Utah, up to February 1. Infestations in the Red River bottoms of southwestern Arkansas had reached economic proportions by mid-January.

Truck Crop Insects Active

INSECT activity was widespread on vegetable crops in the lower Rio Grande Valley of Texas during the second week of February but was mostly light to medium. Fall chinch bug infestations, however, were very heavy on lettuce, turnips and beets. Aphid populations were medium on lettuce, and darkling beetles were locally heavy on tomatoes in the Mission area. Other insects causing some concern were corn earworm on lettuce, beet armyworm on spinach, cabbageworms on cabbage and broccoli and cabbage aphid. This latter insect was showing considerable increase in populations at this time.

In the Charleston, South Carolina, area, green peach aphid was moderately abundant in cabbage plant beds and on spinach during the latter part of January. Turnip and cabbage aphids also caused some concern on cole crops in this area. Vegetable weevil was damaging turnips in southeastern Georgia in mid-February.

Sweetpotato Weevil Spreading

THE sweetpotato weevil, an introduced pest of sweetpotatoes, which occurs in areas of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia and South Carolina, has been found in several new counties recently. These include Houston and Geneva in Alabama; Gulf, Franklin and Bay in Florida; Oktibbeha in Mississippi; and Bleckley, Dodge, Harris, Pulaski, Troup and Laurens in Georgia.

Other Insect Conditions

SPOTTED heavy infestations of winter grain mite occurred in many small grain fields in the north Texas area in mid-February. Heavy local infestations of false chinch bugs were reported on alfalfa in Dimmit county, Texas, in late January. Based on the fall egg survey for alfalfa weevil, in New Jersey, this pest may be of serious economic importance in that State in 1956 as far north as Trenton, and some commercial damage will occur as far north as Monmouth, Middlesex and Hunterdon

(Continued on Page 123)

FERTILIZER
Views and News

By Vincent Sauchelli

About Nitrogen and Cations

DESPITE the great fund of knowledge accumulated by agronomic investigators these past 100 years, we still lack much fundamental data on how plants feed and are not too sure as to the quantity of each plant nutrient required per unit of soil for maximal yields without depleting that soil. The problem is complicated by the fact that an applied nutrient has to satisfy the microbial requirements of the soil as well as those of the crop to be grown.

It is known that most farming practices deplete the soil's nitrogen supplies. All too often nitrogen is the limiting factor in farming, even where a legume may be included in the rotation. A generation ago, the cost of a unit of nitrogen from one of the several organic sources commonly used then was so high that the application of nitrogen was restricted to minimum amounts. Now relatively low-priced synthetic nitrogen has taken over the market and generous applications are the rule. Nitrogen, generally, returns a profit and yet the question still is asked: how much nitrogen is profitable? That, of course, is a hard one to answer. Some are satisfied with a $3 return on a $1 investment in fertilizer; others, who are more familiar with the economic return per acre are not satisfied unless they can get the most attractive maximum per acre instead of the high return per dollar.

A recent study at the Arkansas Agricultural Experiment Station emphasizes what was shown previously by other soil scientists, namely, that nitrogen applications can influence the ability of plants to compete with each other and with the soil for the basic nutrients, such as potassium, calcium, magnesium and phosphate. This influence of nitrogen is associated with what is known as the "cation exchange capacity" of a plant's roots.

The root of a plant respires and in so doing generates hydrogen ions which, because they are "basic" in chemical characteristics as opposed to "negative," are called "cations." A hydrogen ion is not a nutrient. The root swaps the hydrogen ions to the soil in exchange for the nutrient cations, potassium, calcium, magnesium, ammonium and phosphate. Different crops have different capacities for exchanging hydrogen for these cations. Generally, the roots of the grasses and cereals have a *lower* exchange capacity for potassium but a higher one for calcium than those of the legumes (clovers, alfalfa). In a mixture of grass and legumes, the grass is at a disadvantage with the legume in competing for the potassium. The Arkansas research previously referred to contributes this interesting new knowledge based on work with 20 different crops: the more nitrogen a root contains, the higher is its cation exchange capacity. Thus by increasing or restricting the nitrogen supply of the soil it may be possible to increase or decrease the ability of a plant to take up, say, potassium or magnesium. For oats, the cation exchange capacity was increased by 40% from a low to a high nitrogen level of the soil; for corn, the increase was about 30%; and for each of the other crops used, it was roughly about 10 per cent.

It has been known to soil scientists for some time that under certain conditions the grasses in a grass-legume sod have a tendency "to hog" the available potassium away from the legume and eventually take over the area: the legumes "peter out." The Arkansas research shows that by applying nitrogen to a grass-legume sod the cation exchange capacity of both become more compatible, that is, they compete with each other on a more even basis. Their roots are made more nearly alike with respect to getting their share of potassium, and both grass and legume thrive better.

British Query Ammonia Use

A BRITISH commentator referring to the expanding use of liquid ammonia in the United States declares that since it is an unbalanced fertilizer the danger is always present that once the special equipment to apply it is available on a farm it is all too easy to pursue an excessively nitrogenous policy. He believes it does not necessarily follow that the farmer saves money by using liquid ammonia simply because it has the lowest nitrogen-unit cost: over-application and rapid assimilation, he says, have very often produced excessive vegetative growth which could not be utilized or successfully harvested and at the same time such excessive growth tends to deplete the soil of other nutrient reserves. Furthermore, he believes that the boom in liquid ammonia consumption will naturally lead to enriched liquid compound fertilizers, which have phosphates and potash harnessed to the lower cost liquid nitrogen. This development may outstrip the use of treating solid phosphates and potash with liquid ammonia. Necessity is always mothering invention. The invention in this case will be not the necessity of farming practices or of soil but that of liquid ammonia producers who will be faced with an abrupt slowing down of the spec-

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tacular phase of the liquid ammonia sales program. "Cost per unit is not always the only measure of economy, and novelty is not always the herald of progress," he says.

Time alone will tell how it will all end. During 1955 we have witnessed a strong tendency on the part of many ammonia retailers to engage also in the preparation and sale of liquid complete (NPK) fertilizers, particularly in those areas of the Middle West and Mississippi basin where anhydrous ammonia has become well established. No definite trends in consumption of liquid complete fertilizers are as yet clearly discernible in any of the major agricultural regions of the U.S.A.

That Narrow Margin of Profit

F. G. C. Fison, chairman of Fison's, Ltd. (Gr. Britain), one of the world's leading fertilizer companies, made the following comments in the course of his annual review of his firm's business. I cite them because of their pertinence to the business of fertilizer firms everywhere:

> "An important reason for this reduced profit has been the lowered margins on fertilizers. The sales targets were achieved, but a continuous rise in cost in virtually all items entering into fertilizer manufacture prevented us from maintaining our profits. . . . I have referred to a continuous rise in cost during the year under review. To a minor extent this was the result of price increases made by the producers of raw materials, but the larger part of the increase resulted from the the very rapid rise in freight rates. I do not think it is generally appreciated how large a part freight rates, in fact, play in our economy. It may be of interest if I say that in the present year 60 per cent of the increase in the raw material bill is accounted for by increases in freight principally on phosphate rock.
>
> "Overhead expenditure is continually increasing as is necessary in order that the industry may progress. *The balance between a reasonably prosperous and very progressive industry and a poor backward industry is very fine and depends on marginal amounts in the selling price.*" (Italics mine. V. S.)

The italicized statement should be driven home to everyone served by the fertilizer industry. The best investment a farmer and dealer can make is to permit the fertilizer firms serving their interest to earn that small margin of profit in the selling price. With that, the firms can make technological and service improvements and support research which in turn enable the industry to serve agriculture more efficiently. The future profitability and survival of our industry depend much on the achievements of the research staff.

Fertilizers and Farm Profits

WE have questioned often why more farmers are not con-

(*Continued on Page* 136)

Letters to Dr. Sauchelli

Agricultural Chemicals
Caldwell, New Jersey
Gentlemen:

This is to commend you for the excellent article by Dr. Sauchelli in your November issue with reference to the solubility of phosphate fertilizers. We are very glad to see Dr. Sauchelli as a regular contributor to your magazine. In this case he has entered fearlessly into a discussion which has not been at all times in the best interests of the industry. We hope he will continue to contribute as that article alone is worth far more than a year's subscription.

Very truly yours,
W. P. MacDonald
F. H. PEAVEY & CO.
Director

Dear Dr. Sauchelli:

Your column "Fertilizer Views and News" in the November 1955 issue of *Agricultural Chemicals* was very informative and interesting.

The idea of if we could prevent fixation of the phosphorus by slowing up the rate of dissolution occurred to me several years ago, thereby removing one of the major problems in the use of fertilizers.

You mention that the efforts of many agricultural engineers and agronomists in recent years have been directed to finding means by which to retard or prevent this soil fixation. Have you any particular references in mind that I can consult?

Taking into consideration that other "impossible problems" have been solved together with new forms of fertilizers (granular), innumerable new compounds on the market and machinery to perform the work, the idea-on the surface-is not insurmountable. That is, of course, if you think it would be advantageous and worthy of a slight premium to cover additional costs.

Your opinion would be appreciated.

Yours very truly,
N. J. Thomas
Associate Professor
Ontario Agricultural College
Guelph, Canada

Dear Dr. Thomas:

When I referred to the work of engineers and agronomists directed to finding means of retarding or preventing the fixation of phosphates in the soil, I had in mind the process of granulation and the new machinery developed for precision application. I, too, have thought about the possibility of developing certain types of phosphatic compounds which, like urea form releasing nitrogen slowly, would similarly release phosphorus slowly. Several years ago a Dr. Stewart at the Arizona Experiment Station, I believe, did considerable work with organic phosphates. It was his conclusion that certain types of organic phosphates might be used successfully as sources of nutrient phosphorus. The cost of such compounds was prohibitive for fertilizer use. Undoubtedly, this is the reason why such materials are not being used by the industry.

You may be familiar with the work done by Dr. Dale Sieling who is now director at the Massachusetts Experiment Station. Sieling and his associates investigated the effect of organic matter on phosphate availability in acid soils. They have reported the effect of 19 organic anions and 6 sugars in preventing phosphate precipitations by iron and aluminum through the pH range of 3 to 8. The citrate anion completely prevented the precipitation of phosphate by iron and aluminum. The tartrate and the oxalate ions were also effective. They report that the oxalate ion increases the availability of soil phosphate. They explain the action on the basis of a chelation effect.

In New Zealand, H. W. Johnston of the Department of Scientific and Industrial Research at Wellington worked with various organic compounds in his study of the availability of dicalcium and tricalcium phosphates. He reports that he was able to demonstrate that a large number of organic acids are capable of solubilizing both forms of calcium phosphate. He points out that the reaction does not depend all together on the acid pH of the solution used, but it is related also to the structural characteristics of the acid. Johnston's article was published in the *New Zealand Journal of Science and Technology*, Vol. 33B pages 436 to 466 (1952) and the second paper in the same journal Vol. 36 pages 49 to 55 (1954). These studies by Seiling in the U.S.A. and Johnston in New Zealand deserve very careful consideration from agronomists. If it is possible to mix certain of these organic materials containing acid ions and also certain sugars with a superphosphate or dicalcium phosphate in order to prevent the precipitation of soluble phosphate and, further, to make much more available phosphate from the soils storehouse of phosphate, then we may have a practical method of increasing the efficiency of the fertilizer phosphates.

Sincerely,
V. Sauchelli

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As a result of recent federal legislation, specific standards of safety have been established for the application of pesticides to food crops.

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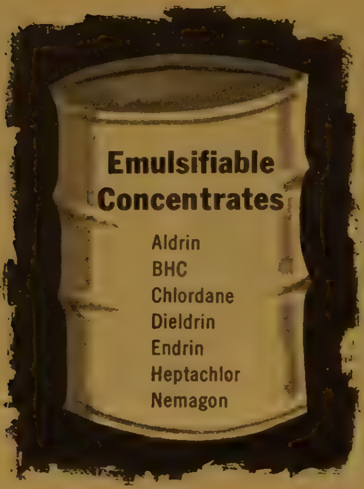

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Technical SECTION

Antitubercular Compound to Influence Weed Control Research

COMPOUND INH (isonicotinic acid hydrazine), used extensively for the treatment of several varieties of tuberculosis, has been found to be an active inhibitor of root growth by research workers at the University of Michigan. Experiments in the laboratories of the Department of Botany indicate that, in aerated water cultures, roots of Moore barley seedlings grown for five days in the dark were inhibited to the extent of 50 percent, on a dry weight basis, by 350 ppm INH added 24 hours after the seeds were moistened. Roots were yellow in color, although not proportionately reduced in length.

Previous work in the field, reported early in 1955 by D. J. Wort, describes effect of INH on growth of plants when applied to the foliage of established seedlings. General retardation of top growth was observed with concentrations of the antitubercular compound at 0.4 to 1.6 percent. Solutions of the same concentration applied to the soil similarly caused stunting, except at the 1.6 percent level, which was lethal to several species. Further experiments showed that in oats, beans and sugar beet seedlings, leaf catalase and phosphatase activities were depressed, although only slightly, by treatment with 1.2 percent INH. These experiments might suggest that plants are not particularly responsive to this compound; a conclusion at variance with observations on other plant systems that are affected by far lower concentrations of INH.

In cucumber germination tests in 1947, the elongation of the primary root of cucumber var. Early Fortune at 25° was inhibited 50 percent by a concentration of INH of 225 ppm. The response curve for Moore barley was almost coincident with that for cucumber at low INH concentrations, with the 50-percent inhibition point occurring at 220 ppm. Root elongation of Koto flax, however, was more sensitive to this compound. Fifty-percent inhibition was observed at 37 ppm. In these root responses, INH is about one-fifth as active as maleic hydrazide, which has found some uses as a growth regulator and growth repressant.

Top application of INH to young Black Valentine bean plants, either as droplets containing 50 or 100 Mg, to the base of an unifoliate leaf, or by immersing the unifoliate leaf in a solution of either .001m or .0001m for 48 hrs. did not result in any detectable growth repression or morphological change. Only at much higher levels of application was growth repression evident, as is reported by D. J. Wort.

It appears that INH has physiological potency in the inhibition of root growth and development at levels much lower than those that give any morphological responses in the tops of established plants.

It is suggested that from the ranks of such compounds, materials suitable for preemergence weed control should be sought. Effect of Isonicotinic Acid Hydrazide on Some Plant Systems, A. G. Norman, *Science*, June 10, 1955, Vol. 121, No. 3154.

Karmex W For Morning Glory

More than 20,000 acres of cotton in Arizona are being cleared of morning glory by use of Karmex W (CMU). The seedling stage of annual weeds such as watergrass, carelessweed and groundcherry are also controlled. The vine-like growth of the morning glory (*Ipomoea hirsutula*) entangles cotton plants, making both hand and machine picking nearly impossible.

Karmex W works like a selective herbicide when applied as a spray to the soil surface at rates varying from 3/4 pound per acre on light soils, to 1¼ pounds on heavy soils. It is applied just before the last cultivation with a sprayer equipped with positive agitation and with fan-type nozzles.

The residue of Karmex W may have a serious effect on other crops that may follow treated cotton. Barley, oats and wheat may be damaged; however, the grain sorghums are apparently quite tolerant, as is cotton after a lapse of a year. Varieties of cotton show a marked difference in susceptibility to damage from Karmex W. The short staple variety, Acala 44, is one of the least tolerant varieties, but Pima S-1 is quite resistant. "Octopus in Arizona Cotton," *Crop Comments*, Arizona Fertilizers, Inc., Vol. 9, No. 12, Oct. 1955.

Armyworm Studied in Tenn.

Results of tests at the Tennessee Agricultural Experiment Station show that some armyworms are present in the fields the year around, and that four generations and a partial fifth are produced annually. Presence of the Braconid wasp, which kills the armyworm, was thought to be the most important factor governing destructiveness of the pest.

Chemical control measures recommended are: (1) toxaphene dust - 20 percent at the rate of 15-20 pounds to the acre; (2) toxaphene spray - 80 percent emulsion, 1 quart to the acre; and (3) toxaphene bait (effective only on open, sparsely vegetated fields). The Armyworm, S. Marcovitch, Byrd K. Dozier, and W. W. Stanley, *Tennessee Farm and Home Science*, Progress Report No. 16, Dec., 1955.

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Mercury-BHC for Sugar Beet

Research in Britain on the protection of sugar beet from pests suggests that a combined mercury gamma-benzene-hexachloride seed dressing is the best deterrent against soil pests, while increased steckling emergence has been obtained by treating seed with panogen (a liquid organic mercury), thiram or ethyl mercury phosphate. The most successful post-emergence sprays for weed control have been nitrate of soda and salt; and while pre-emergence weed sprays have been less successful, the most satisfactory has been isopropyl phenyl carbamate applied as an aqueous suspension at four pounds to the acre and worked into the seedbed before drilling.

•

Control of Houseflies

At the Kentucky Agricultural Experiment Station, Lexington, Ky., control of horseflies on dairy cows was attempted by use of Sulfoxide-Pyrecel, 1 part to 9 parts water and by Sulfoxide-Pyrecel, 1 part, with thanite, 1 part, in 18 parts water. Groups of cows were sprayed at the rate of 60 ml. to each animal.

Horsefly repellancy was excellent with both materials immediately after spraying and 24 hours after, says a station report, but repellancy was poor 48 hours after spraying. Hornfly control was excellent with both materials throughout the test. The same materials were tested again at the same dilutions, but using 130 ml. of spray for each cow. Sulfoxide-Pyrecel gave about 3 days protection from horseflies and hornflies, while the Sulfoxide-Pyrecel with thanite mixture gave about 2 days of fairly excellent protection for both these flies.

•

Endrin for Mite Control

Control of a mite pest which attacks many varieties of ornamental plants may be just around the corner, say two entomologists at the University of California at Los Angeles.

Writing in the university's extension service publication, *Flower Notes*, entomologists F. S. Morishita and R. N. Jefferson state that endrin, a Shell Chemical Corp. insecticide, proved encouragingly successful against the cyclamen mite in large-scale laboratory and commercial tests on such florists' crops as azalea, cyclamen, saintpaulia, and others.

"Endrin proved so superior to the other materials available," they testified, "that it was felt the results should be published." So far, it has been hard to control the mites for two reasons. First, they enter developing buds and flowers, where sprays cannot readily reach them. Second, most sprays do not affect the mites.

Morishita and Jefferson worked with several combinations of application methods and dosage rates. They suggest a spray application of two pints of an 18.5 per cent endrin emulsifiable concentrate plus four ounces of Triton X-100, a commercial wetting agent, to 100 gallons of water. Three sprays should be applied at three-week intervals, and the series should be repeated in 4 to 5 months.

Endrin should not be used on food crops such as spinach or strawberries until present residue studies have been completed.

LITERATURE AVAILABLE

The following list reviews a series of bulletins on fertilizer, insecticide and fungicide recommendations, controls, etc. For the most part, these bulletins and reports are prepared by the various state agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

Effect of Varying the Volatilization of Methyl Bromide by Combinations with Various Solvents on Its Distribution in Bulk Grain Fumigation. An 18-page bulletin reporting lab studies made to investigate behaviour of methyl bromide and mixtures of methyl bromide with various solvents in the fumigation of bulk wheat and milled products. Bulletin AMS-73, USDA, Agricultural Marketing Service.

INSECTS AND RELATED PESTS OF AGRICULTURE IN WASHINGTON. Bulletin lists agricultural pests in nine major sections; Tree Fruit Insects; Small Fruit Insects; Vegetable Crop Insects; Field and Forage Crop Insects; Specialty Crop Insects; Florist and Ornamental Crop Insects; Insect Pests of Domestic Animals; Stored Products Insects; and Household Insects. The pests in each group are listed according to alphabetically arranged sub-headings such as aphids, beetles, etc. Washington Agricultural Experiment Station, State College of Washington, Station Circular 274, Oct., 1955.

INSPECTION AND ANALYSIS OF COMMERCIAL FERTILIZERS IN SOUTH CAROLINA. The 60-page booklet contains the analyses of 6,413 official fertilizer samples procured and analyzed for the period July 1, 1954 through June 30, 1955. Other data pertaining to fertilizer usage, fertilizer recommendations, approved ratios and minimum analysis grades, pH requirements for various crops, and definitions of certain fertilizer terms are included. Bulletin 430 South Carolina Agricultural Experiment Station, Clemson Agricultural College, Clemson, S. C.

JOHNSON GRASS CONTROL. The bulletin contains recommendations for control of Johnson grass by use of TCA, borate-chlorate combinations or sodium chlorate, and by crop selection and land management methods. Bulletin 265, Agricultural Experiment Station, University of Arizona, Tucson, Ariz.

A FIELD EVALUATION OF TERMITE REPELLENTS. A report containing evaluations of the toxic qualities of 37 chemicals as termite repellents. Field investigations were carried out in the jungles of Panama by the Naval Research Laboratory. Methods of impregnation of test panels and of testing procedure are included. Report, PB 111737, OTS, U.S. Dep't. of Commerce, Wash. 25, D.C.

Liquid Fertilizer Pump

Inexpensive metering devices for the application of liquid fertilizer have been studied for several years under an arrangement worked out by the Agricultural Engineering Dep't. of North Carolina State College and the Farm Machinery Section, USDA, and the results of this investigation are reported in a paper by Charles W. Bantt, USDA engineer.

North Carolina has developed a constant-head chamber for the gravity flow system and USDA has made improvements and modifications on what was a non-commercial hose pump so that this hose pump is now being manufactured, sold and used nationally as a liquid fertilizer metering pump. Studies in North Carolina revealed that usage on 12 acres of land will justify a $100.00 liquid fertilizer applicator. Development and Characteristics of a Multiple Discharge Hose Pump for Metering Liquid Fertilizer, Charles W. Gantt; prepared for presentation at the Northeastern Section A S A E meeting, Storrs, Conn., Aug. 22-23, 1955.

How a Fulton-created re-usable bag cut customer's costs over 60%

By: **LOUIS J EVEN,** *Sales Manager*
New Orleans Branch
Bag Division
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Alfalfa: Comb. Treatment

Evaluation of many new organic polychlor and phosphate insecticides for control of insects most commonly infesting alfalfa in Wisconsin has resulted in recommendations for a mixture of two types of insecticides to gain effective kills.

Control of the most important of the injurious insect species, potato leafhopper, mirids, and grasshoppers, is best accomplished in the nymphal instars of growth. No single insecticide was found effective for the residual control needed for seed production. Best results are obtained with DDT plus dieldrin, or similar mixtures which use a good leafhopper insecticide and a good grasshopper and mirid insecticide.

For non-residual control, necessary for forage production, parathion appears to be satisfactory. However, because of its toxicity, it is not recommended to the farmer. Methoxychlor and Perthane for leafhopper, and aldrin and heptachlor for mirids and grasshoppers were good possibilities. Control of Common Alfalfa Insects in Wisconsin, J. T. Medler, *Journal of Economic Entomology*, Vol. 48, No. 6, Dec., 1955.

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Phosphates in Acid Soils

Application of phosphate fertilizer has not helped to prevent phosphate starvation of crop plants in acid soils in Connecticut.

Research by Dr. Tsuneo Tamura, Dep't. of Soils, Connecticut Agricultural Experiment Station, shows that phosphate fertilizers in acid soils may be "stolen" from plants, while potassium is made more available. Important in soil-mineral relationships is the compound, alumina, a widely distributed metallic oxide. In Connecticut soils, a plate or layer of alumina is commonly "sandwiched" between two layers of silica to form a typical clay mineral. The acid conditions under which Connecticut soils have formed however, caused some of the clay minerals to decompose, freeing alumina, the filler of the "sandwich". Fertilization to maintain an acid soil reaction as for potatoes and tobacco, results in the same action and the remaining clays become saturated with alumina. When phosphate fertilizer is applied, the free alumina combines with phosphate to form aluminum phospate. Aluminum phosphate is not soluble in water. Soil Mineral Studies Show Role of Alumina, Connecticut Agricultural Experiment Station, Dec. 19, 1955.

•

Blackheart of Celery

Data covering six rates of fertilization with a commercial 5-5-8 mixture in four replications on celery showed that black heart of celery is associated with calcium deficiency. Blackheart of Celery and its relationship to Soil Fertility and Plant Composition. P. J. Westgate, W. G. Blue and C. F. Eno, *Proc. Florida State Hort. Soc.*, 67, 158-163 (1954).

Caterpillar Control by Virus

British scientists have discovered a virus which kills caterpillars of the cabbage white butterfly. Dr. Kenneth Smith and Mr. Claude Rivers at the virus research unit of the Agricultural Research Council, Cambridge, England, while examining a collection of caterpillars, noticed that some had stopped feeding and others were dead. The reaction to this virus suggests control of cabbage caterpillars by deliberate infection.

The dying caterpillars were actually liquefying (there was no evidence of bacteria) and when the caterpillars were examined it was found that they had been attacked by a virus disease of granulosis type.

Drops of highly infectious fluid from the decomposing caterpillars

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Thylate—New Apple Fungicide

A new light-colored apple fungicide which has given outstanding fruit finish in a number of field tests is being readied by the Du Pont Company for the 1956 season. The company's petition for residue tolerance and application for registration of "Thylate" thiram fungicide have been accepted for review by Federal authorities. The official notice of filing appeared in the "Federal Register," December 23, 1955.

The new material is based on thiram (tetramethyl thiuramdisulfide) which has been under test as an apple fungicide in Connecticut for 11 seasons and has been evaluated in trials by investigators in 16 other states. It has also been tested by commercial growers in New Hampshire, Pennsylvania, Virginia, Delaware, Indiana, New York, Massachusetts, West Virginia, Maryland, and Michigan. The Food and Drug Administration granted a temporary tolerance for limited grower trials in the 1955 growing season.

In addition to controlling apple scab, thiram has given good control of cedar-apple rust. Where it has been used as the only fungicide in the spray schedule, there has been no injury to foliage or fruit, even in early-season sprays on sensitive varieties.

Thiram is one of the family of dithiocarbamate fungicides developed by the Du Pont Company. This family includes "Fermate" ferbam fungicide, "Parzate" zineb and nabam fungicides, "Manzate" maneb fungicide and "Zerlate" ziram fungicide. Thiram has been used commercially as a seed protectant and turf fungicide for over 10 years. Meanwhile, the University of Connecticut pioneered in evaluating the compound as an apple fungicide, and investigators in other states included it in some of their comparative tests.

Although the only recommendations proposed for 1956 will be for use on apples, thiram has also been studied for control of various diseases on other fruits and certain vegetables. There has been no chemical injury from the use of thiram on any of these plants, and the non-russeting characteristic seems to apply to pears as well as to apples.

Subject to registration for commercial use and establishment of a residue tolerance, plans are being made for marketing "Thylate" thiram fungicide in five and 50-pound bags. Usual recommendation for use on apples is one and a half to two pounds per 100 gallons of spray applied in a conventional scab control schedule. It can also be applied in concentrate sprays up to eight times normal concentration.

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may be splashed about the leaves of a plant by rain; any caterpillar eating the leaves will then become infected by them.

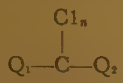
Numbers of large white butterflies are being bred continuously under artificial light this winter. When some 10,000 larvae have been infected, the virus will be extracted; and it is hoped that by spraying plants with a weak suspension of the virus in the spring and also by distributing infected caterpillars, some control over the pest may be obtained.

INDUSTRY PATENTS

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received outside of the United States the cost will be $1.00 per copy.

2,722,497. Pesticidal Compositions and Their Use. Patent issued November 1, 1955 to Jack S. Newcomer, Grand Island, N. Y., assignor, by mesne assignments, to The Pennsylvania Salt Manufacturing Co., Philadelphia. A composition prepared for use in combating fungi and insects, comprising a surface active agent, and at least one monocyclic unsaturated five-member carbocyclic compound containing the molecular fragment defined by



$$\overset{Cl_n}{\overset{|}{Q_1\text{—}C\text{—}Q_2}}$$

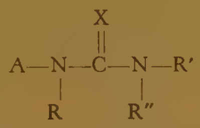
wherein C is a nuclear carbon atom; wherein n represents an integer from 1 to 2; wherein Q_1 represents the grouping =C=O of which C is a nuclear carbon atom; wherein Q_2 represents an unsaturated group selected from the class consisting of

=C=O, —C=C—, and =C=NH

in which unsaturated grouping selected from said class each C is a nuclear carbon atom, and wherein the remaining valences on the five-membered carbocyclic ring which are not a part of said molecular fragment are satisfied by at least one of the group consisting of hydrogen, oxygen, chlorine, alkyl, chlorinated alkyl, alkenyl, chlorinated alkenyl, alkylidene and chlorinated alkylidene, said composition forming an emulsion with water upon agitation therewith.

2,723,183. Process for Production of Ammonium Nitrate. Patent issued November 8, 1955 to John J. Dorsey, Jr., Monroe, La., assignor to Commercial Solvents Corporation, Terre Haute, Ind., a corporation of Maryland. In a process for producing ammonium nitrate by reacting nitric acid and ammonia at elevated temperature and continuously removing steam and molten ammonium nitrate as reaction products, the improvement which comprises dissolving from about 5% to about 30% solid ammonium nitrate by weight in the nitric acid feed.

2,723,193. Herbicidal Process and Product. Patent issued November 8, 1955 to Charles W. Todd, Westtown, Pa., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware. A method for the control of weeds which comprises applying to a locus to be protected, in amount sufficient to exert a herbicidal action, a substituted urea represented by the formula



$$A\text{—}\underset{R}{\underset{|}{N}}\text{—}\overset{X}{\overset{\|}{C}}\text{—}\underset{R''}{\underset{|}{N}}\text{—}R'$$

where A is a monovalent binuclear aromatic radical selected from the group consisting of naphthyl, halonaphthyls, lower alkyl naphthyls, nitronaphthyls, sulfonaphthyls, biphenylyl, halobiphenylyls, lower alkyl biphenylyls, nitrobiphenylyls, and sulfobiphenylyls, X is oxygen, and R, R′ and R″ are selected from the group consisting of hydrogen and monovalent aliphatic radicals of 1 to 3 carbon atoms inclusive, with the proviso that at least one of said R, R′ and R″ is an aliphatic radical.

2,723,910. Plant Defoliants. Patent issued November 15, 1955 to Lyle D. Goodhue and Carolyn E. Tissol, Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Delaware. The method of defoliating a plant which comprises applying to said plant an amount, sufficient to effect defoliation of said plant, of an organic sulfide having the general formula $RS_{(x)}R'$ wherein R and R′ each represents one of straight and branched-chain alkyl groups, cycloalkyl groups, alkylcycloalkyl groups and alkaryl groups, (x) represents an integer from two to five and wherein R and R′ each contains only hydrogen and carbon, at least three and not more than 10 carbon atoms and are not necessarily identical.

2,731,339. Low Volatility Herbicidal Compositions. Patent issued Jan. 24, 1956 to William R. Davie, Pittsburgh, Pa., assignor to Pittsburgh Coke & Chemical Co., Pittsburgh. A cold stable herbicidal concentrated solvent solution of a 2-ethyl hexanol-1 ester of at least one halogenated phenoxyacetic acid selected from the group consisting of 4-chloro-2 methyl phenoxyacetic acid, 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid, said concentrated solvent solution containing at least four pounds of equivalent acid as the ester per gallon of solution.

Book Reviews

Potassium Symposium, 1954, published by International Potash Institute, Bern, Switzerland. 445 pages, paper bound.

Printed in French, Spanish, German and English, the book contains the 21 papers read at the annual meeting of the board of technical advisers of the International Potash Institute (four sessions) in Zurich, 1954. Professor H. Duel conducted the sessions.

Analysis of Insecticides and Acaricides, by Francis A. Gunther and Roger C. Blinn. Published by Interscience Publishers, New York. 696 pages, $14.00.

The volume is a treatise on sampling, isolation, and determination, including residue methods. Included are chapters on:

Persisting Residues as an Analytical Problem; Presampling Considerations; Sampling Considerations; Sample Processing, Pre-analysis and Cleanup Treatment; Interpretation of Data; Analytical Bookkeeping; Health Hazards in Residue Laboratories. Ultraviolet and infrared spectra are included in the appendix.

Organic Insecticides, Their Chemistry and Mode of Action by Robert L. Metcalf. Published by Interscience Publishers, New York. 392 pages, $8.50.

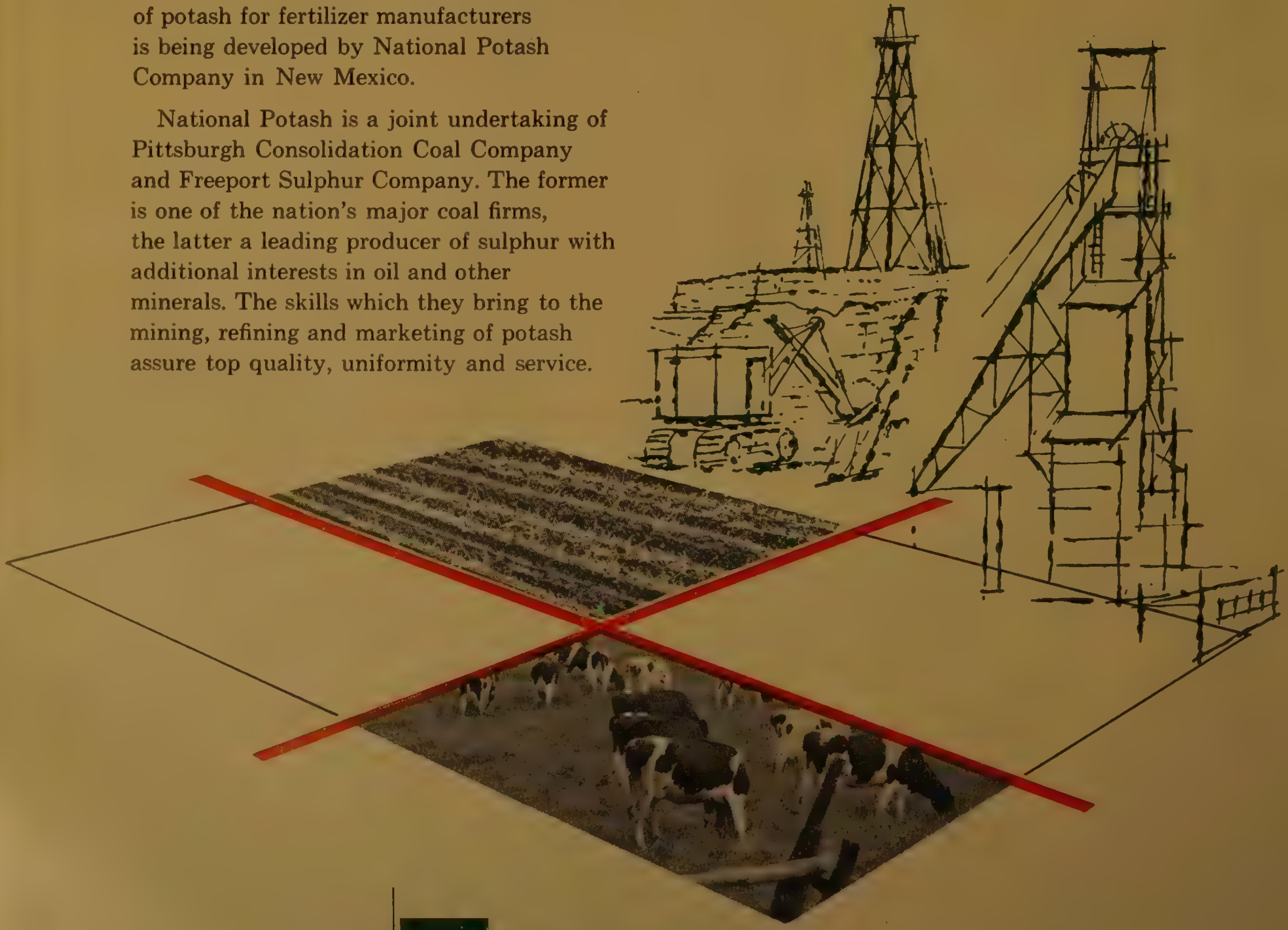
The author's monograph, *The Mode of Action of Organic Insecticides*, published in 1948 as Review No. 1 of the Chemical-Biological Coordination Center, National Research Council, Wash., D. C., is the basis of this recently published volume. Subject material is divided into chapters on: Nicotine, Nornicotine, and Anabasine; Rotenoids, Pyrethroids; Joint Action of Insecticides; Organic Thiocyanates; Dinitrophenols; Dichlorodiphenyl-trichloroethane; Acaricides; Benzene Hexachloride; Cyclodiene Insecticides; Organic Phosphorus Insecticides and Carbamates. A chapter on insecticide resistance completes the book.

N P

a joint venture in Potash

A new, substantial and dependable source of potash for fertilizer manufacturers is being developed by National Potash Company in New Mexico.

National Potash is a joint undertaking of Pittsburgh Consolidation Coal Company and Freeport Sulphur Company. The former is one of the nation's major coal firms, the latter a leading producer of sulphur with additional interests in oil and other minerals. The skills which they bring to the mining, refining and marketing of potash assure top quality, uniformity and service.



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WASHINGTON Report

by Donald G. Lerch

Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

THERE'S a three-cornered race in progress that's going to have a big effect on the income of those in the agricultural chemicals business. The race is among Washington lawmakers, farmers, and the relentless surge of the spring growing season as it moves northward into the principal farming areas of this nation,

Time, tides, and the planting seasons wait for no man and that includes the Washington politicians facing extremely difficult decisions as they hammer out farm legislation designed to stem plunging farm income, and at the same time give farmers confidence in the growing season right at hand. There's a feeling among businessmen that the faster Washington makes up its mind, the sooner farmers will be able to make their spring planting plans and lay in supplies.

Actual consumption of fertilizer as seen here will be dependent largely upon the outcome in Washington. One thing is certain, farmers are not going to buy early. Matter of fact, actual purchases this season may be later than anything witnessed to date. Farmers know there is a plentiful supply of plant food, prices do not appear strong, and the government's farm program is still in the making.

While the use of pesticides is governed more by insect conditions than any other single factor, the pesticide industry is also anxiously waiting the outcome of the Congressional battle.

* * *

Setting the tone for the NAC spring meeting, Lea S. Hitchner, executive secretary, National Agricultural Chemicals Association, observes that "few questions are more important today than this problem of raising farmers' net income.

"Speakers at the spring meeting are exploring a number of ways farming efficiency can be improved through the use of pesticide chemicals, and these advances will benefit the nation's farmers and growers," Mr. Hitchner added.

Certainly the efficient use of pesticides and fertilizers can do much to reduce the per unit cost of production and so add to the net income of farmers and growers. Realizing that, in general, farmers use only half as much plant food as agricultural experiment stations believe would be advisable, and that insects and diseases cost billions of dollars a year, it's easy to see that the agricultural chemicals industry still has tremendous room for expansion regardless of the immediate outcome of the farm program developed in Washington this year.

* * *

Several advertising managers and executives of the pesticide industry are planning to attend an information workshop scheduled for the Turrialba Experiment Station in Costa Rica immediately following the NAC spring convention in Florida. The one or two day meeting is of special interest to agricultural chemical companies who market in the Central or South American areas. The Latin American editors, writers, broadcasters, and publishers attending the meeting will study many phases of agricultural communications. The portion of the program set aside for meetings with agricultural chemical manufacturers is slated to include a session for planning a "typical campaign."

Present thinking is to build the campaign around the control of torsalo—a pest affecting cattle. While many countries will be represented at the workshop, it's hoped the campaign will be fitted into a single country so it can be on a practical basis. Publicity and advertising will be discussed along with demonstrations of the effectiveness of various means of using pesticides for controlling torsalo.

The workshop is being sponsored by the International Cooperation Administration with the writer of this column, formerly on the NAC staff, serving as a consultant. Dana Reynolds, Chief of the Institutions Branch of the International Cooperation Administration, whose group of South American editors and writers attended the Mayflower Hotel meeting of the NAC Foreign Trade Committee, is planning the overall program in cooperation with those at the Turrialba Research Center.

While the chief purpose of the workshop is to improve agricultural communications, the very act of so doing may well serve to enlarge markets for agricultural chemicals.

* * *

Industry leaders are much interested in the goals for vegetable crops, since this provides a major market for agricultural chemicals. In this category, the farm program is reasonably well set for the year. While the U.S. Department of Agriculture does not have mandatory control over acreage, the recommendations are made usually on the basis of consultation with industry committees, and are often rather accurate forecasts of what the planted acreage will be.

This field of agriculture appears rather stable, with the planting guides calling for a reduction of only two percent total acreage for fresh summer vegetables, and one percent for fresh fall vegetables. Major reductions are called for summer melons, being 9 percent, and 6 percent for

(Continued on Page 126)

ALABAMA PEST CONTROL WORKERS FORM NEW ASSOCIATION: AACEP ELECT G. R. WILLIAMSON PRESIDENT

Newly elected officers of the AACEP: G. R. Williamson, Agricultural Chemical Service Co., Montgomery, president; and Norman Downey, Hercules Powder Co., Birmingham, member of board of directors; standing (left) U. L. Diener, API, vice-president, and W. G. Eden, API entomologist, secretary-treasurer.

ALTHOUGH the boll weevil may be resistant to chlorinated hydrocarbon insecticides in some areas, there is little or no evidence of resistance in Alabama," stated Dr. F. S. Arant, head of the API Agricultural Experiment Station, at the annual Alabama Pest Control Conference held Feb. 23-5 at Auburn, Ala. "Chlorinated hydrocarbons were highly effective in control of boll weevil in 1955 in field experiments conducted in central Alabama," he continued, in reply to the question "Insect Resistance . . . Fact or Fiction?

"Laboratory research revealed little or no evidence of resistance to such insecticides as toxaphene, heptachlor, endrin, dieldrin, BHC, and aldrin. However, there is experimental evidence that the cotton aphid has developed resistance to BHC in some, but not all areas of the state."

Dr. Arant listed the following data on studies concerning the susceptibility of the boll weevil in Alabama and Louisiana. The tests indicated, he said, that although the Louisiana weevils showed a definite resistance to the chlorinated hydrocarbons, there is no indication that there is any resistance in Alabama.

LD-50 in Micrograms of Insecticide per gram of Boll Weevil

	Endrin	Bayer 17147
La. Susceptible Species	.80	.30
La. Resistant	99.00	.58
Carbon Hill, Ala.	7.82	3.08
Auburn, Ala.	10.19	3.62

Of considerable interest to the 200 entomologists, government and industry representatives attending the three-day meeting, was the formation of the Alabama Association for Control of Economic Pests. The new association voted on a constitution and by-laws and elected George Williamson, Agricultural Sulfur Co., Montgomery, as president. Other officers and directors of the new group are: vice-president, U. L. Diener, API; secretary-treasurer, W. G. Eden, API; and directors: Norman Downey, Hercules Powder Co., Birmingham, Ala.; H. C. Young, USDA, Florala, Ala.; T. J. Cavanagh, PCO, Mobile; J. E. Zeigler, Velsicol Corp., Millbrook, Ala.; P. B. Livingston, State Department of Agriculture, Montgomery; and Oscar Frazier, Centralla Farmer Coop., Selma, Ala.

Getting back to pest control in Alabama, Coyt Wilson, API, opened this discussion with a review of the "Importance of Pest Control in Alabama." He reported that one of the most important pest control problems is the need for better fungicides and insecticides. "Brown rot disease of peaches is an old disease" he said, and although it has been studied extensively, the best fungicide that we have is wettable sulfur, and this material is only partially effective. "Many of our most effective insecticides are dangerous to handle, as they create a problem in regard to residues." The solution to these problems, he remarked, will require close cooperation between the chemists, entomologists and plant pathologists. Another problem is the need for improvement for applying pesticides. Fungicides for killing such soilborn fungi as *Sclerotium rolfsii* and *Fusarium vasinfectuns* are available, but we have no practical means of bringing them into contact with the fungi in the soil. Since the materials are not volatile they must be distributed uniformly . . . an impossible task with our present equipment. The solution, observed Dr. Wilson, will require the assistance of agricultural engineers, and possibly the physicist.

In a discussion of insect pests on cotton, R. L. Robertson, API, reported that recommendations for cotton insect control for Alabama in 1956 include the following dusts:

Bollweevil:

- 2.5% aldrin—5% DDT
- 3%g. BHC—5% DDT
- 3%g. BHC—5% DDT alternated with calcium arsenate
- 5% chlorthion 5% DDT
- 1.5% dieldrin—5% DDT
- 2% endrin
- 2.5% heptachlor—5% DDT
- 2.5% methyl parathion—5% DDT or 20% toxaphene

As sprays, he said, equivalent amounts of the above insecticides, except calcium arsenate, should be applied as emulsions in 2 to 8 gallons of spray per acre. The schedule for boll weevil, if followed, will control bollworm, he remarked. For heavy infestations, he said, apply 10 per cent DDT or 3 percent gamma BHC-10% DDT, or 2 per cent endrin dusts.

The materials listed for boll weevil control as dusts or sprays, except aldrin-DDT, dieldrin-DDT, and heptachlor-DDT mixtures if used as recommended will usually suppress cotton aphids. If heavy infestations occur, Alabama suggests using applications of parathion or malathion. Additional control measures for spider mite include dust application of aramite, malathion, parathion or chlorthion with DDT.

Any dust or spray recommended for bollweevil control, observed Mr. Robertson, except calcium arsenate, will control thrips.

W. G. Eden, API, discussed a new insect pest threatening Alabama farmers . . . the European corn borer. First discovered in Alabama in 1950, Dr. Eden said this pest did very little damage until 1954 when it played havoc with pimento peppers in northern Alabama. Three generations of the borer were found in 1955 . . . the first two in corn and the third in peppers, he explained. To help control the corn borer, Dr. Eden suggested turning under all crop residue before moths emerge in the spring.

In a further discussion of vegetable pests in Alabama, Dr. Eden reported that the corn earworm may be controlled with emulsion sprays of DDT; 1% rotenone or 1-2% parathion is suggested for aphids on turnips . . . and although demeton does an excellent job on this pest, he said, it is not recommended on turnips until residue questions are cleared. On pimento peppers, 2 lbs. of DDT per acre as a spray or dust is recommended . . . granules, however, are not suggested for use on pimentos. DDT and Ryania are the two insecticides that have given best control of the corn borer on corn in the mid-west. EPN, heptachlor and parathion are promising insecticides for this purpose.

Variables in Pest Control

A PANEL discussion on "Failures in Pest Control . . . Factors, Causes" emphasized that one of the most critical factors in pest control is the operator-applicator, himself. Participating in the panel were D. E. Davis, who reported on the herbicide question; E. B. Vinson, who discussed household insects; U. L. Diener, who outlined practices in applying fungicides and fumigants; and W. A. Ruffin, whose remarks dealt with control of field crop insects.

D. E. Davis indicated that "we have been oversold on herbicides. We can't expect 100% results 100% of the time." It is true, he continued, that producers would like to have a "sure-fire" chemical, but too many factors — other than the insecticide-affect control. Citing use of DNBP, he remarked that this product is recognized as a good herbicide. "Still," he said, "in 1952, it caused tremendous losses to cotton in Alabama." Critical factors affecting results with this herbicide alone include: (1) weather, (2) soil . . . type and condition, (3) temperature, and (4) what kind of plant is to be treated.

W. A. Ruffin, also indicated that there are many factors that enter into good insect control other than the insecticide used. "The cause for most failures in pest control," he said, "is people not knowing enough about insects or insecticides.

"Some of the factors that result in a poor job of insect control are poor application, inadequate surveys, not enough good equipment, and the weather. Poor results from improper application might be due to the time

Left, top photo: V. S. Searcy, API assistant agronomist; D. C. Francisco, TVA right-of-way supervisor, Chattanooga, Tenn.; and Dr. J. A. Lyle, API botany and plant pathology department head.

Left, bottom photo: R. M. Russell, Orkin Exterminating Co., Atlanta; Dr. F. S. Arant, API, and E. B. Vinson, Dexter Pest Control and Service, Inc., Birmingham, Ala.

Center photo: G. H. Blake, API, H. L. Haller, Crops Research, USDA, Washington, D. C.; and Coyt Wilson, API.

Right, top photo: E. V. Smith, API, F. I. Jeffery, Southeastern Plant Pest Control Area, Montgomery; and E. H. Sweeney, Alabama Pest Control Association, Mobile.

Lower right: W. H. Bennett, Southern Forest Experiment Station, New Orleans; W. B. DeVall, API; and H. R. Johnson, Southern Forest Experiment Station, Gulfport, Miss.

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of day the insecticide is applied, the interval between applications the rate of application, or many other factors.

Urban L. Diener, in his remarks on successful use of fungicides and fumigants stressed that the single most important factor in controlling a plant disease by fungicide application is the *Applicator* himself. It all boils down, he said, to the applicator's knowledge of:

1. chemical to be used
2. crop plant, land, its environment
3. pest to be controlled

In a resolution of the question, U. L. Diener indicated that knowledge may be acquired primarily from experience, labels and literature, the pesticide salesman, pesticide dealer, county agent, all of whom may suggest precautions or limitations for a given material.

In pest control, he said, especially with regard to plant diseases, physical and other control methods should not be overlooked in preference to chemicals alone.

F-P Mixtures in Alabama

"INSECTICIDE fertilizer mixtures promise a formulation, that allows the farmer to do two important field jobs in one operation," observed W. G. Eden in a report to the Alabama meeting. In the present day pesticide-fertilizer mixtures, 95 percent contain an insecticide. The other 5 per cent includes fungicides, herbicides, or nematocidies. To date, he said, it is generally considered that the commercial use of pesticide-fertilizer mixtures outstrips research findings about them.

In Alabama, remarked Mr. Eden, insecticide - fertilizer mixtures are recommended for use on corn for corn rootworm and wireworms; on sweetpotatoes for wireworms and larvae of fleabeetles; on Irish potatoes for wireworms; on pastures and small grains for ants and other soil insects; and on various crops in connection with white-fringed beetle control. The proportions of insecticide and fertilizers vary according to the pest to be controlled and the rate of fertilization. The mixtures, he reported, are generally made by the fertilizer manufacturer on a custom basis . . . only small amounts if any stocks are carried in inventory because the desired proportions are so variable.

"Food growers have nothing to fear from the Miller Pesticide Residue Amendment if they follow label directions closely and avoid carelessness in using pest control materials," H. L. Haller, of the Agricultural Research Service, Washington, told the group, in a review of "The Miller Bill and its Implications."

According to Dr. Haller, the Miller bill is designed to permit farmers to use pesticides in producing food crops without hazard to customers. The law becomes effective July 22.

In a report on "Hazards in Pest Control," Dr. Haller said "A sound education program which incorporates proper selection of pesticides and their safe use is imperative." This education program is necessary, he said, because of the hazards in handling and using pesticides. He explained that poisoning had occurred from pesticide

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manufacture and formulation, application, residues, and exposure, but these accidents were often caused by carelessness in handling.

For safe handling of pesticides, remarked Dr. Haller, properly designed containers and equipment, availability of respiratory devices and gas masks, and strict adherence to label directions are basic. Persons planning to use any pesticide should first learn of its human toxicity, he stressed.

Weed, Brush Control

MOST of the annual weeds can be controlled in cotton, reported V. S. Searcy, API, with a pre-emergence application of CIPC and/or from 1 to 3 applications of post emergence herbicidal oil. The most consistent weed control, he said, has been obtained by using both methods. For peanuts, the dinitro compounds as a pre-emergence treatment are very good for controlling most annual weeds. There are other chemicals that look good on cotton and peanuts and may be recommended at a later date. The poorest job of weed control in Alabama is being done in pastures. Most of the troublesome pasture weeds such as Cherokee rose, dock, bitterweed and summer cedar can be controlled effectively and economically with 2,4-D. Recommendations have been published by the API Agricultural Experiment Station as Leaflet 43.

Brush control continues to be one of the major problems connected with the transmission of electrical energy in the Tennessee valley region, pest control operators were told by D. C. Francisco, TVA, Chattanooga. One of the major programs is that of brush control along the highways, he said, and detailed in his report the importance and practical operation of this program.

Fruit, Forest and Other Pests

REPORTING on Fruit Insect and Disease Control, C. C. Carlton, API, indicated that nearly all insects that attack fruits in Alabama can be controlled by the application of insecticides. "The plum curculio can be controlled by using two pounds of arsenic of lead, 2 lbs. of 15% parathion, 2 lbs. of EPN 300 or 4 lbs. 25% malathion. The oriental fruit moth, he said, is controlled by the sprays used for curculio, except arsenic of lead. Peach tree borer can be killed in the trunks of trees by the standard treatments of PDB or ethylene dichloride. He listed control measures for strawberry weevil, flower thrips, brown rot, bacterial spot, etc. "Root rot and crown gall," he said, "are two diseases for which control measures are needed."

The forest insect situation in Alabama is more serious than in any other state in the lower South, W. H. Bennett, U. S. Forest Service Entomologist, New Orleans, declared as he labeled the pine bark beetle the most destructive forest insect in Alabama. The best control, he said, is rapid use of infested timber, or by cutting infested trees and spraying the bark with a benzene hexachloride solution. He stressed the need for insecticides

(Continued on Page 102C)

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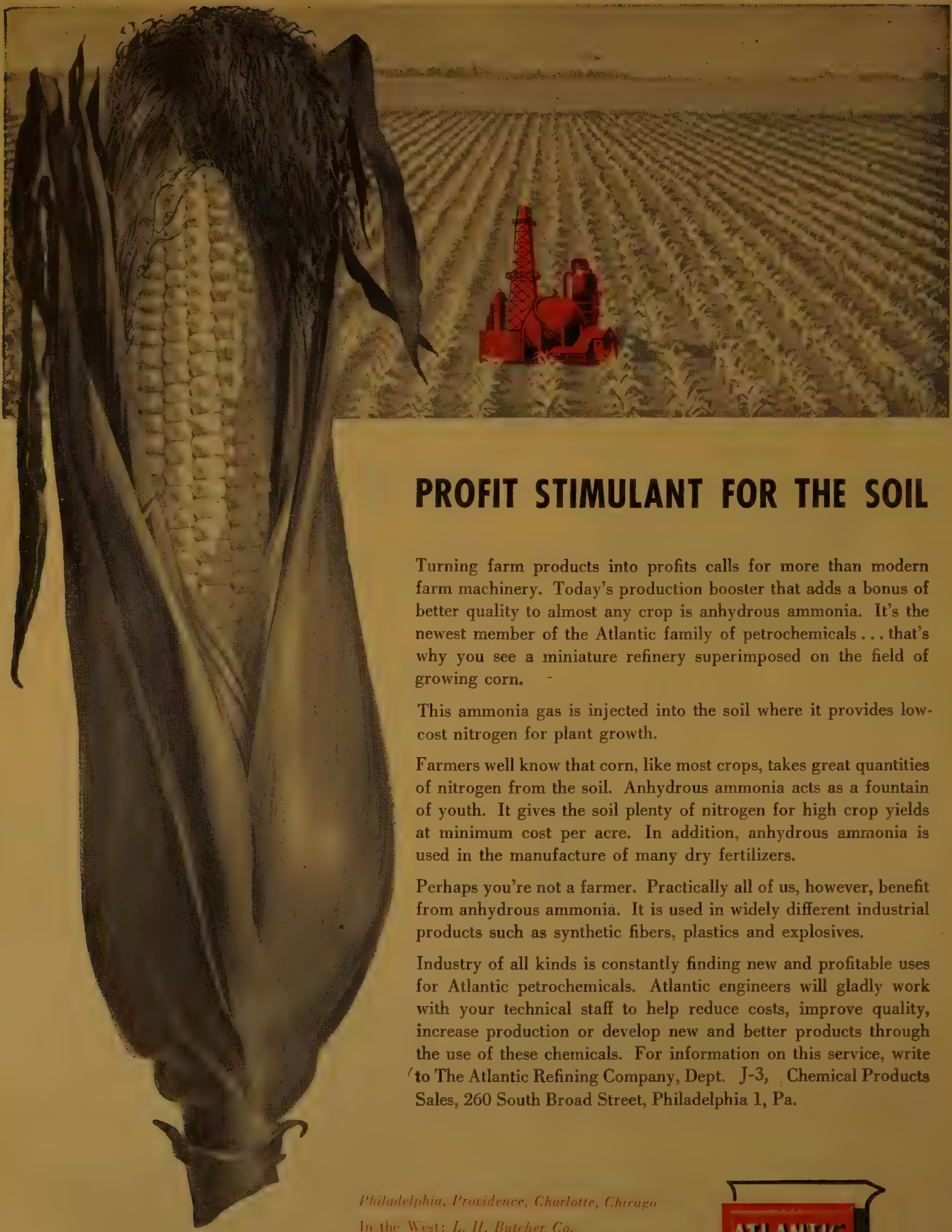

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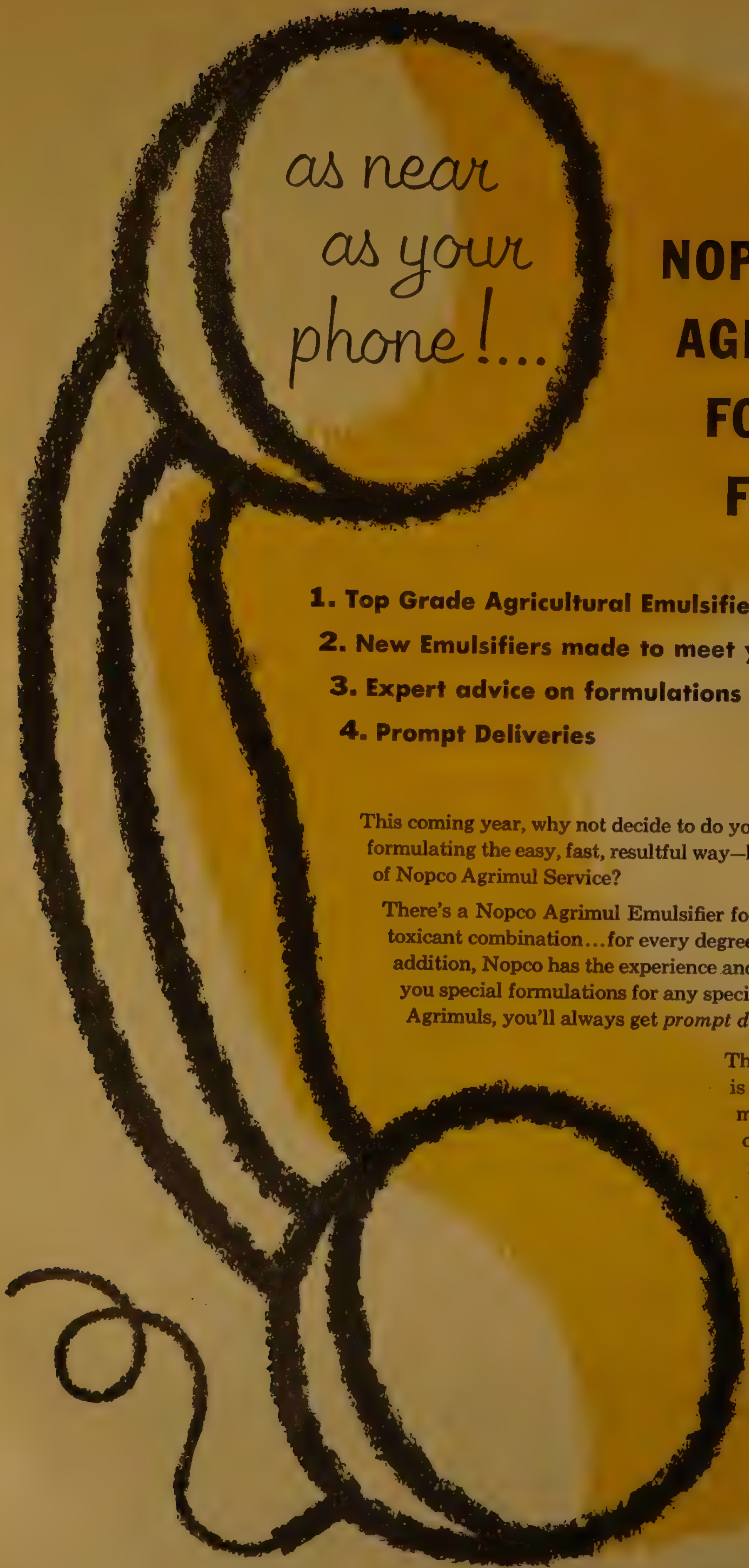

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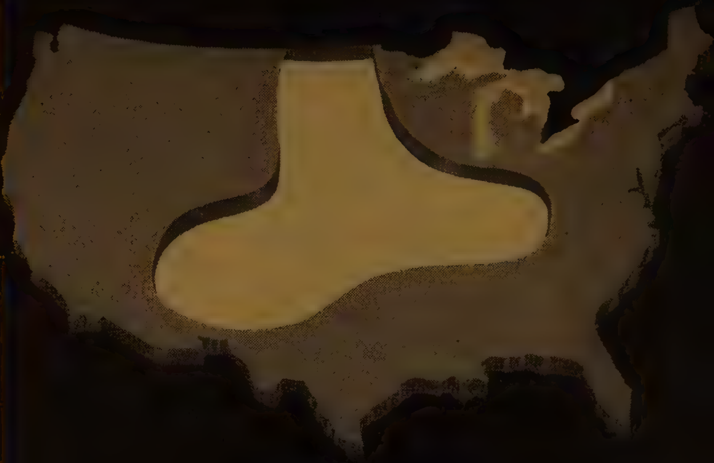

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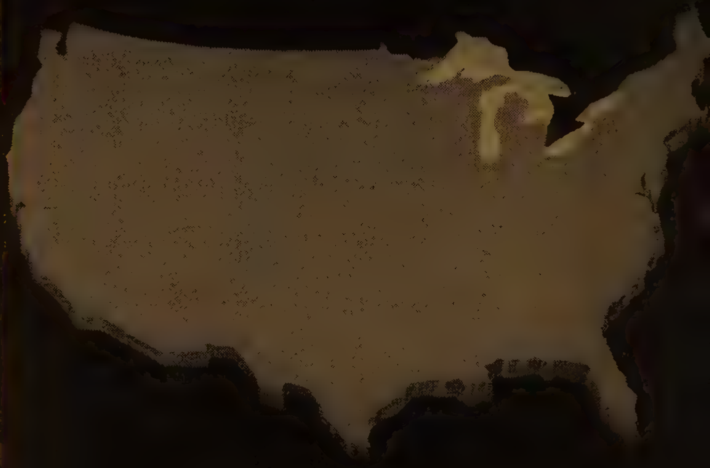

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Western Cooperative Spray Project Conference in Oregon

By Charles H. Starker

RESEARCH entomologists and plant pathologists representing state, federal and provincial research agencies met in Portland, Oregon, January 19, 20, 21 at the Imperial Hotel for their 30th annual meeting. Dr. Roderick Sprague, project chairman, welcomed industry representatives to the "open" meeting on January 21st, and introduced section leaders who summarized regional research activities during 1955.

Stone Fruit Pests

Organic phosphates fell down in the control of green peach aphis in many areas of the Northwest. In several sections respraying was necessary to control late-season reinfestations. Cherry fruit fly emergence was delayed and in some cases prevented in soil treated with drenches of isodrin, endrin and dieldrin at Prosser, Washington. A survey of grower spray practices for fly control indicated wide variation in gallonage of dilute spray per acre as well as pounds of parathion per acre being used. In spite of this all had evident control. At Dalles, Oregon, spray and dust applications of perthane, malathion, and lead arsenate gave excellent control of this pest; and in the Yakima valley parathion, diazinon and perthane gave the best control 14 days after application. In Oregon, perthane gave excellent results; no mites were noted in diazinon plots, but heavy mite damage was noted in perthane wettable blocks. Oregon work on fumigation of cherries for fresh market fruit before shipping was reported as being successful, with no deleterious quality change in samples treated and shipped under refrigeration to California.

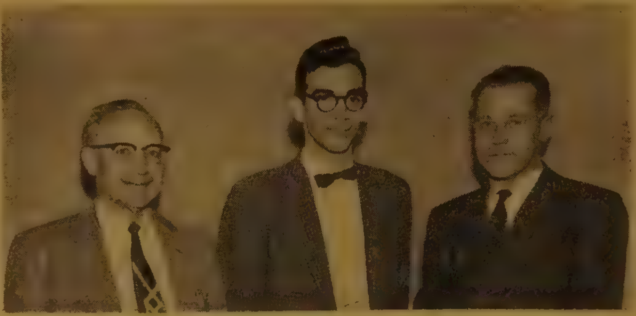
Ethylene dibromide at ½ lb. per 1,000 cu. ft. for 2 hours was the treatment used. No material tested against two-spotted mite on sour cherries at Dalles, Oregon, was effective for longer than 5 weeks. Aramite was best, but it was outstanding only for the first three weeks.

In Yakima, the San Jose scale on peaches was controlled effectively with parathion at pre-bloom. Diazinon was not effective at that time, but performed much better later in the season. At Wenatchee, both parathion and diazinon gave good control in the delayed-dormant, but parathion plus oil was best. In California, experimental applications of Ryania and diazinon for control of Orange Tortrix on apricots at petal fall, and May treatments, were compared with TDE at petal fall or parathion in May. At harvest, results showed Ryania equaled standard treatment of TDE. Although diazinon reduced fruit damage considerably, it was not as effective as other materials used. Work on prunes in California showed 1303 was the most outstanding product used to reduce red mites, bringing populations down to a very low level for the season. Pre-bloom applications of 923 eliminated European red and clover mites, allowing only two-spot to develop on these plots. Parathion, ovotran and diazinon held two-spot and clover mites in check, but seemed to be weak against European red mite.

(*Continued on Page 135*)

1956 Officers

George F. Knowlton, Utah State Coll, Logan, Utah co-chairman; L. C. Terriere, Agricultural Chemical Dept. OSC, Corvallis, Ore, chairman; and Anthony S. Horn, Univ. of Idaho Extension Serv., Boise, Idaho —secretary.

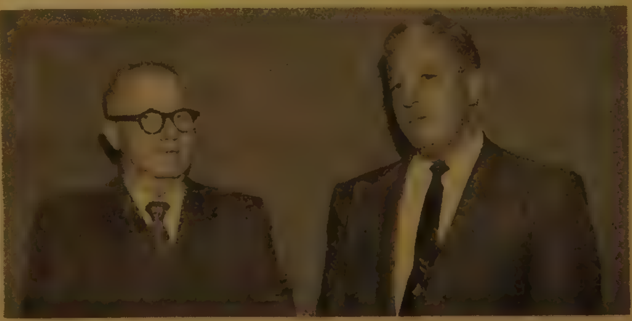


Northwest Vegetable Insect Control Conference

FEDERAL, State and Dominion entomologists from seven western states and provinces met January 16, 17, 18 at the Imperial Hotel, Portland, Oregon, for the 15th annual Northwest Vegetable Insect Conference. Chairman A. J. Walz of the Parma, Idaho branch Experiment Station introduced Dr. W. C. Cook of ARS, USDA, Walla Walla, Washington, conference chairman for 1956, who called on section chairmen for summary reports of 1955 work reviewed at the 3-day meeting.

Crucifers

Endrin gave better results than parathion, when used for control of cabbage seedpod weevil in north-western Washington. It was reported that there are some indications this species of weevil may be showing resistance to certain organic phosphates; however commercial applications of parathion at usual rates gave good control. Schradan appeared superior to parathion against cabbage aphis. Tests on cabbage maggot showed this pest harder to control on peat than on mineral soils, using hepatchlor and aldrin.



1956 Officers

W. C. Cook, ARS, USDA, Walla Walla, Wn. chairman; Howard E. Dorst, ARS, USDA, Logan, Utah, secretary. Not shown Harry Andison, Canadian Dept. of Agriculture, Victoria, B. C. co-chairman.

Carrots

Canadian work against carrot rust fly gave indications that pesticides incorporated into soil to a 6-inch depth gave better control than those at the 3-4 inch level. Additional work showed placing aldrin, dieldrin and heptachlor into the soil before seeding gave better and longer-lasting control than surface bands of these same materials.

Onions

Dieldrin and heptachlor were tested against onion maggots under comparable conditions in Idaho. Dieldrin gave excellent control at all rates, but heptachlor failed to give control at ¼ oz. actual per pound of seed. Oregon workers were able to control this pest in some areas with the use of DDT dust on a 10-day schedule. Seed and furrow treatments of isodrin, malathion and diazinon gave promising results on green bunching onions. Isodrin was very effective in tests run in western Washington.

Wireworms, other Soil Pests

Soil applications of DDT at 10 lbs. technical per acre had lost their ability to kill newly hatched wireworms at the end of 10 years. Treatments of 20 and 40 lbs. of the same age were still effective. Wireworms are no longer a problem in southern California, due to wide-spread use of EDB as a soil fumigant, and the inroads of real estate and highways into many areas of high infestation. Parathion was impressive in several trials against symphylids in western Oregon and Washington in 1955, but failed in others. Parathion at 5 lbs technical per acre was better than 20 lbs. of malathion. There are some indications that parathion may contribute to plant nutrition. Even where it did not give symphylid control, corn matured faster and foliage was a richer blue-green color than in check plots. The soil fumigants EDB, Vapam and Nemagon appear promising against this pest on the basis of preliminary trials. Aldrin, dieldrin and heptachlor at 10 lbs. technical per acre, worked thoroughly into the soil, were reported effective in some areas, but not in

(*Continued on Page* 134)

NW Agricultural Chemical Industry Conference

THE third annual Pacific Northwest Agricultural Chemical Industry Conference, was held at the Benson Hotel, Portland, Oregon, January 18, 19, 20. This meeting, which was sponsored by the Western Agricultural Chemicals Assn., attracted a group of some 135 industry research and sales personnel from the Pacific Coast, as well as other areas of the country. Mr. E. L. Turner, California Spray Chemical Co., Portland, conference chairman, officiated at the various sections during the conference.

The Miller Bill

IN a panel discussion of the Miller Law,G. Wallace Rynerson, FDA, Portland, reviewed the operation of PL 518, and its provisions, suggesting that label directions for use should be followed closely. It would be quite unsafe for a grower to experiment with a new material on his crops, he emphasized, for if no recommendation has been made for that particular crop, chances are that tolerances would be exceeded. FDA inspectors will check commodities at shipping points, and on farms to determine various levels on different crops during the growing season, Mr. Rynerson stated.

D. W. Dean, Pesticide Regulation Section, USDA, San Francisco, explained how the Miller Bill ties in the consumer-protective features of the Food, Drug and Cosmetic Act with those of the Federal Insecticide, Fungicide, and Rodenticide Act, providing a tool which can be used to regulate the maximum amounts of pesticides present on raw agricultural commodities in interstate commerce. Currently, there are some 40,000 products or labels registered in the Pesticide Regulation Section, of which some ¾ are agricultural products. Because many of these were registered prior to the Miller Bill, they were of course not reviewed for specific tolerances on specific crops. The Pesticide Regulation Section is currently reviewing these labels so that they will conform. However, even before the Miller Bill was passed, the section reviewing labels did give a great deal of attention to residues, and certain basic label provisions were insisted upon when they seemed necessary; thus "Do not use within 30 days of harvest", "Do not use after edible portions of crop begin to form", or "Remove residues at harvest" will provide a wide margin of safety under the Miller Bill.

The procedure in the Department of Agriculture as far as new chemicals and crops are concerned, is to wait until the FDA has announced a tolerance, before completing registration of a product, Mr. Dean continued. In this way, the Department can be reasonably sure claims and directions will be in line with the tolerance as accepted, so that the grower - if he follows label directions - should be able to produce a crop which will not exceed the tolerance. However, this statement applies when only *one* pesticide is involved. It does not necessarily apply when more than one chemical is applied to the same crop. When a petition comes to the section for study, it is concerned with but a single chemical, and the data presented covers only the use of that chemical - not any of the infinite number of possible combinations with other chemicals. This is a fact which should be remembered by everyone who makes, sells, recommends, or uses pesticidal chemicals.

While individual tolerances are stated in terms of parts per million of the chemical, chemicals that have the same physiological activity are considered *additive*, and the FDA has grouped these chemicals for the purpose of computing residues.

Dr. H. S. Telford, head, Department of Entomology, WSC, Pullman, stated that the Miller legislation will increase research costs at the Experiment Station level. In prior years, people working on agricultural crops could rely on sale of produce from their experimental blocks for financial return; but now this income will be largely lost, because there will be no tolerance for the produce and it will have to be dumped, because it would be illegal. Thus on apples, returns of $40 to $60 per tree could be expected, cherries $80 per tree; raspberries, strawberries, around $1200 per acre. Where plots are replicated, crop value involved can become considerable. Publications of the Experiment Station released prior to the Miller Bill will all have to be reviewed and checked carefully. Then what about the "specialty crop", where the potential volume is so small, the manufacturer does not wish to go to the expense of securing registration for his product on that crop? On rhubarb we have a tolerance for DDT of 7 ppm, but all other materials are automatically 0. Is it the place of the Experiment Station to petition for such additional uses? Another matter for concern is one of tolerances being high enough, so that if a pest later becomes resistant to a pesticide and larger amounts or more frequent applications are called for, will this then exceed the tolerance established?

Industry's side of the Miller Bill was outlined by Dr. L. R. Gardner, California Spray Chemical Co., Richmond, Cal. "Costs of developing a new chemical can run fairly high", he stated. For toxicity work alone, a

(*Continued on Page* 132)

(1) Miller Bill Panelists: H. S. Telford, WSC, Pullman; G. Wallace Rynerson, FDA, Portland; C. O. Barnard, WACA, San Jose; L. R. Gardner, California Spray Chemical, Richmond; D. W. Dean, USDA, San Francisco; David L. Bischoff, Washington Canners Co-op, Vancouver.

(2) Vernon W. Olney, Geigy, Fresno; Jack Lomax, Velsicol, Riverside; Hubert W. Kinney, Olin Mathieson, Yakima.

(3) New Conference chairman for 1957: William I. Zeigler, American Cyanamid Co., Portland.

(4) Symphylid Panelists: A. J. Howitt, Western Wasington Experiment Station, Puyallup; H. E. Morrison, Oregon State College, Corvallis; Chuck Starker, Pacific Supply Co-op, Portland.

(5) Floyd Johnson, General Chemical Co., San Francisco; E. H. Littooy, Colloidal Products Corp., San Francisco; Keith Sime, Chipman Chemical Co., Portland; Winfield Drown, Monsanto Chemical Co., Seattle.

Custom Spray Operators' School

By H. B. Petty

AN intensified debate on using granulated DDT for control of the European corn borer highlighted the program of the eighth Illinois Custom Spray Operators' Training School on the University of Illinois campus at Urbana, Illinois, January 26-27.

Registration included 565 from Missouri, Iowa, Indiana, Wisconsin, Minnesota, Michigan, Ohio, Kansas, Pennsylvania, Illinois and Manitoba, Canada. Men from the chemical industry made up the largest group with 192. Ground spray operators were next with 136, farmers third with 110, educators, hybrid seed corn producers, canning company representatives and farm managers with 106 and aerial spray operators with 21.

The school was staged by agronomists, entomologists, and agriculture engineers of the University of Illinois College of Agriculture and the Illinois Natural History Survey. Featured speakers were from these institutions as well as industry and the U.S.D.A.

Granulated DDT Proposed

GROUND tests in Iowa and aerial tests in Illinois showed as good or perhaps better control with granulated DDT as with DDT sprays. When this report was given, custom spray operators immediately were wondering what effect this would have on their business. Would it mean new equipment? Would it be more expensive to apply? Could they keep their same profit margin and get a better job done for the farmer? At the end of the school, some operators thought they might try it on a limited scale only. The bulk were going to wait for improvements in equipment and technique so they could be more sure of the actual production benefits to their customers.

New ground equipment for application of granular DDT is being developed at a rapid pace, reported T. A. Brindley, professor of entomology at Iowa State College and entomologist in charge of the U. S. D. A. European Corn Borer Research. Research indicates equipment may be perfected which might enable custom operators to cover as many acres per day as with spray at a very reasonable cost.

Figuring on the basis of prices quoted during the school, William H. Luckmann of the Illinois Natural History Survey said cost of granular material would be about the same per acre as with spray, comparing only applications on the ground. Others estimated the per acre cost of granular DDT to be 20 per cent higher than sprays. Aerial applications would be more expensive because of higher rates needed, boosting the material cost as much as 50 cents or more per acre.

Attapulgite clay of the RVM-AA type, tobacco base and KWK bentonite are the carriers which appear to be best for the use in preparing granulated insecticides, reported Brindley. Experiments to date indicated that more effective borer control is obtained with granules in the 30/60 or 30/40 mesh range than with large sized particles. Such granules impregnated with 5 per cent DDT should be applied at the rate of 15 to 20 pounds per acre.

For best results, the granules should be released in a band 12 to 14 inches wide, approximately 8 to 10 inches above the whorl of the corn plant for first-brood borers. The same width of band is generally required for second-brood applications, too. Granules should not be forced down on the corn, for too many then bounce to the ground. Best method is to fix equipment so they are allowed to dribble over the whorl, advised Brindley. At present, adaption of metering mechanisms of grass seeders, grain drills and fertilizer distributors have worked best, with outlets closed except those needed right over the corn plant.

Brindley issued this warning—that only granular DDT which has been tested on corn should be applied. A poor grade of soluble oil used in some granular materials tested in Iowa disclosed that corn could be burned severely by such a product, he reported. Actual tests on corn will disclose that fact.

Up to 87 per cent control of corn borer by aerial application of granular DDT was reported by Luckmann. This was equal to a ground application of 25 per cent DDT emulsion applied in the same tests. Twenty to 25 pounds of 5 per cent granules per acre should be used with aerial application. Granular forms of EPN and dieldrin showed considerable promise, but these materials are not recommended as yet.

Equipment designed for air seeding of rice gives the best distribution of granules, it was found out in the Illinois tests. Air-seeding devices apply granules better than conventional crop dusting equipment. The effectiveness of crop-dusting equipment is variable, and all such units should be carefully checked for rate and pattern before being used for applying granules, Luckmann advised. For best distribution, aircraft should fly 35-40 feet above the ground. At this height, good coverage can be expected on 14-15 corn rows.

New Timing Technique

THE tassel ratio index technique in timing insecticide applications for control of the corn borer was introduced by Mr. Luckmann. He described it as a simple and exceedingly accurate technique. It involves comparing the relationship between height of the developing tassel and height of the plant and expresses maturity of the plant as a number ranging from 1 to 100.

As an example, suppose the extended height of the corn plant is 45 inches, and by dissecting the plant, the distance from the base of the plant to the tip of the tassel is found to be 9 inches. By using the formula below, the plant has a tassel ratio of 20.

$$\frac{\text{Height of tassel 9 inches}}{\text{Height of plant 45 inches}} = .20 \times 100 = 20$$

Experiments conducted by the Illinois Natural History Survey indicate that corn borers do not survive well on corn with a tassel ratio of less than 20 no matter how much leaf feeding or borers can be counted on the plant. Best stage for single treatment is when the ratio is between 46 and 49. With large acreage, spraying should commence for single applications at the ratio of 40, so that all of the fields could be covered at the correct time.

REPORTS AT CUSTOM SPRAY OPERATORS' TRAINING SCHOOL INDICATE THAT:

- **Attapulgite clay of the RVM-AA type and KWK bentonite are the carriers which appear best for use in preparing granulated insecticides.**
- **TCA and Dalapon, although effective against giant foxtail, are too toxic to normal crops to be used.**
- **Dalapon . . . most effective herbicide against quackgrass.**
- **2,4-D and MCP are effective herbicides for use on Canada thistles. Most promising new chemical is amino triazole.**

Here is the rule of thumb to use: Spray if 75 per cent of the whorls show leaf feeding with 3 to 6 live borers in each whorl and the tassel ratio is between 20 and 55.

Surveys conducted throughout central and northern Illinois in 1955 showed that only about 10-12 per cent of the total corn acreage reached this critical period of growth during the time of first-generation moth flight, and most of these fields measured 45 inches or more in extended height.

Giant Foxtail

THE most promising of the newer chemicals being developed for pre-emergence treatment of giant foxtail is Randox (CDAA), reported F. W. Slife, of the University of Illinois Agronomy Department. Germinating corn and soybean seed have a tremendous tolerance to Randox, causing little danger of reducing the stand of desirable crops when heavy rains occur after treatment.

Two years of research with Randox indicate that it varies less with the weather than other pre-emergence materials worked with in the past. In extremely dry soil it breaks down very slowly, and when it does rain, it is available to control the grass. Although it does leach in extremely wet soil, the upper layer will hold enough to give good control.

Several grass-specific chemicals are highly effective against giant foxtail in the seedling stage, but they are too toxic to normal crops to be used, Mr. Slife pointed out. Both TCA and Dalapon fall in this category. Excellent results were obtained with them in alfalfa, but this is about the only crop that will tolerate them.

Pre-emergence treatments with 2,4-D some years have done an excellent job on giant foxtail, but it has been so erratic that it has not been accepted as a standard treatment, Slife reported.

Dalapon for Quackgrass

DALAPON was described as probably the most effective herbicide available to combat quackgrass by K. P. Buchholtz, of the University of Wisconsin Agronomy Department. It is absorbed rapidly when applied to leaves and is translocated readily. A practical sequence is to apply Dalapon at the rate of 8 to 10 pounds per acre when the quackgrass foliage is from 6 to 10 inches tall in the early spring. After one or two weeks, the sod should be plowed under and the soil worked down. Control is frequently better than 95 per cent.

Treated areas may be planted to corn or some other late-planted crop if proper precautions are followed. Planting should be delayed four or five weeks to allow the residue to be reduced to a non-toxic level. Although corn and soybeans are sensitive to the chemical, and some risk exists, Mr. Buchholtz suggested they were the most logical crops to follow treatment.

If a field is widely infested with quackgrass, substantial control can be obtained with as little as 4 pounds of Dalapon per acre. Application should be followed by plowing, soil preparation and planting after a delay of several weeks. The lower level reduces application cost and possibility of crop injury; however, more regrowth is likely.

(1) A. E. Pickard, Mt. Vernon, secretary-treasurer of Ground Sprayers Association, (standing), seated: John Knox, Seymour; C. W. Cade, Ivesdale; William Arthur, Stronghurst; and Roscoe Knott, Urbana.

(2) Vernon Anderson, Newark; Charles Laverty, Indianola, Iowa; Albert Henne, Yorkville; and Wayne Byerly, Des Moines, Iowa.

(3) John Brandenburg, Chicago and Marshall McCurdy, Princeville; Dana Stewart, Princeville; Bill Morton, Bowen, Ill.

(4) H. B. Petty, University of Illinois and Illinois Natural History Survey; Herman Meyer, Morton; Harry Fisk, Lyndon; Richard Wiese, Morrison; and Harold Geuther, Jacksonville.

(5) Charles Knote, Cape Girardeau, Mo.; Fred Slife, University of Illinois; and Clyde Parker, Champaign, Illinois.

(6) J. H. Bigger, Urbana; H. H. Stamm, Watseka; Ralph Blair, Mahomet; and Tom Brindley, Ames, Iowa.

(7) Larry Hannah, St. Louis; Elmer Unger and R. J. Fix, Hoopeston, and John W. Nelson of the Michigan Blue Berry Growers' Association, Grand Junction, Michigan.

(8) Joan Finch, University of Illinois, and Jack Wright, Illinois Natural History Survey, help Francis Jackson of St. Joseph, Ill., and Charles White, Burlington, Iowa, register.

(9) John Gagliardo, Farmington; Joe Garland, Dixon, association president, on the right and Bob Hall, St. Charles, Ill.

Maleic hydrazide and amino triazole may be used in essentially the same way as Dalapon for quackgrass control. Mr. Buchholtz advised. TCA is useful as a soil treatment for small areas of quackgrass at rates of 0.5 pound per square rod. Sodium chlorate is also good at 2 or 3 pounds per square rod in late fall.

Only in the experimental phase of development R-326 and Dibutrex are being used in crowding flies with repellents for bait control, reported W. N. Bruce of the Illinois Natural History Survey. Malathion, diazinon and Dow ET-14 were given as examples of good bait and residual sprays.

A heavy overwintering corn borer population, which compares very closely to 1949, represents a serious potential threat to the 1956 corn crop, explained H. B. Petty, extension entomologist. Surveys show that the area roughly north of Highway 36 is heavily infested, and vigorous control measures may be required. Chinch bugs and grasshoppers are a threat in several areas, while the clover leaf weevil population has had a noticeable decrease. Spraying for spittlebugs on first-year hay crop fields in the two northern tiers of Illinois counties may be profitable.

From experimental data, it has been concluded that livestock poisoning from weed chemicals, like the 2,4-D type herbicides, is very unlikely if directions on the labels of the containers are followed. According to experimental evidence, only an extremely large dose of 2,4-D is acutely toxic to livestock. All of the alleged cases of herbicidal poisoning of livestock that have been definitely diagnosed have been found to be due to other causes. The addition of 2,4-D type herbicides doesn't increase the accumulation of nitrates in plants as has been suggested, killing livestock that graze on them. Actually, application decreases their accumulation according to experiments.

Tolerances and the Miller Bill

IN most cases, success in complying with Miller Bill will come to those who follow these three simple rules,

(*Continued on Page* 129)

Garden Supply Trade Show Emphasizes Dealers Role

By H. H. Slawson

ANOTHER banner year in sales of garden merchandise for the home gardener was forecast at the Midwest Garden Supply trade show held in Chicago Jan. 24 to 26.

Reviewing market factors that prompted this prediction, D. Murray Franklin asserted that total sales of garden supplies and allied products in the coming year will exceed the $4 billion estimate made for 1955. Mr. Franklin is publisher of *Garden Supply Merchandiser,* the Baltimore magazine which sponsors the show. He spoke at a gathering of some 5,000 dealers, distributors and manufacturers of garden supplies in attendance at the huge show in Chicago's International Amphitheater.

Chemicals for the green thumb trade easily led the parade of products displayed by 296 exhibitors. About 40 percent of the show was devoted to power equipment and 60 percent to chemicals and allied supplies, the show manager stated.

Dominating the array of new products on display, the Du Pont Company's "Whiff 'n poof" squeeze duster package attracted outstanding attention. Made of polyethylene plastic, this 8 oz. cylindrical package is used for Du Pont insecticide and fungicide formulations for four different purposes. One is for treating rose insects, another for general use on flowers, the third for vegetables generally and the fourth is a tomato dust. This new squeeze duster package is expected to be on garden store shelves throughout the country when the 1956 season gets under way.

American Chemical Paint Co., Ambler, Pa., displayed 16 products for the small package trade with emphasis on a newly patented poison ivy and poison oak killer, said to be the first on the market. A new and aptly named "Garden Doctor" spray for diseases and insect pests of flowers, vegetables and fruit trees was played up, along with Weedone, Gro-Stuf and other familiar products. Joseph H. Torchianon, advertising manager, called attention to the impulse appeal of the attractive new designs on the lithographed metal containers.

Niagara Chemical division, Food Machinery & Chemical Corp., Middleport, N. Y., made a first showing of their line of farm and garden chemicals in newly designed rectangular packages that occupy one-third less shelf space than do the conventional cylindrical containers. Labels have also been redesigned to include pictures of insects and plants on which the chemical is to be used. Among new products shown was a general purpose Niagara garden formula using a wettable powder for application as dust or spray, also a multi-purpose dust or spray for ornamental shrubs and flowers.

Goulard & Olena, Skillman, N. J., placed emphasis on plant foods for roses, tomatoes, bulbs, trees, shrubs, and on lawn weed and poison ivy killers and a dog repellant. Plant supports, fence wickets and other metal products were also shown.

B. G. Pratt Co., Paterson, N. J., centered attention on six products from their line of 30 chemicals for varied purposes. This limited list included a scalacide dormant dust; an all-purpose insecticide-fungicide spray for above-ground insects; chlordane for turf, soil and household insects; a weed killer; malathion for popular and universal use; and an aerosol bomb "for the lady gardener." These, it was explained by Henry B. Pratt, sales manager, will provide the dealer with something to offer his customer, no matter what the job may be, and thereby eliminate the need for the small dealer to carry a large inventory of the complete line, if his business does not warrant it.

California Spray Chemical Corp., Richmond, Calif., showed a new dieldrin spray or granule type formula for turf insects and grubs and a new "Sodar" crab grasskiller, along with other "Ortho" sprays, dusts, fertilizers, herbicides and repellants. Representatives at the booth explained a new dealer help program which includes extensive newspaper and magazine advertising and offers supplies of a new "Ortho Garden Book" imprinted with dealer's name.

Acme Quality Paints, Detroit, Mich., introduced a fruit tree spray with captan as a new ingredient, also a new 5 percent DDT dust in sifter-top package and a new dust gun for tomato insect control. J. R. Hile, sales manager, was in charge, assisted by A. E. Miller and Lou McShane.

Nott Mfg. Co., Mt. Vernon, N. Y., had a new weed killer with liquid sodar plus 2,4-D, and a new crabgrass killer with sodar. Bob Harkins, president, called attention to a new aerosol bomb for a dog repellent, formerly packaged in glass bottles.

Lebanon Chemical Corp., Lebanon, Pa., made their first showing of a new synthetic organic fertilizer containing 40 percent Urea-form nitrogen for which basic ingredients

(*Continued on Page* 127)

AT THE NEW YORK GARDEN SHOW

THE Garden Supply Trade Show moved to the Kingsbridge Armory, New York, February 7-9, and some 150 additional display booths brought the total dealer representation to 450 firms. Products displayed, as in Chicago, included complete lines of chemicals (insecticides, fungicides, herbicides and fertilizers), and such items as lawn and garden application equipment.

A special exhibit of old garden items . . . dating back to the 1860's . . . attracted visitors at the show. Another highlight of the 3-day event was the annual dealer dinner, February 8th, at which Sen. George A. Bender of Ohio, was the guest speaker.

The Power Equipment Panorama, which was initiated at the show two years ago, was more than doubled in space this year. The panorama exhibit included model service shops and garden machine demonstration displays.

Sixty of the leading U. S. manufacturers in the garden supply field were honored Feb. 9 by *Garden Supply Merchandiser* for their efforts toward advancement of the industry.

The awards were presented at the dealer dinner. The citations were based on the participation of the individual companies in ten or more national Garden Supply shows.

For Dependable Insecticides and Herbicides

think first of DIAMOND

Technicals and Formulations

Insecticides

Diamond dependable insecticides have long been favored because of their uniform high quality. DDT, BHC and Lindane Technicals are supplied in many types and forms.

Insecticides for Formulators and Producers

- DDT—100% Technical
- DDT—Wettable Powders
- DDT—Dust Concentrates and Emulsions
- Lindane—Emulsions, Wettable Powders, Dusts
- Lindane—100% Gamma Isomer of BHC
- BHC—40% Technical
- BHC—12% Wettable Powders and Dusts
- BHC—Emulsion Concentrates
- K-101—Miticide

Weed Killers and Brush Control Chemicals

Diamond weed and brush killers, based on the 2,4-D and 2,4-T chemical groups, meet every weed and brush control problem.

These dependable Diamond herbicides are produced in two forms: *Technical* for use by formulators and processors in their own formulations and *ready-to-use formulations* for farmers, ranchers, country clubs and homeowners.

Technicals for Formulators

WEED KILLERS

2,4-D Acid • Technical Butyl-D
Technical Isopropyl-D
Technical 2-Ethyl Hexyl (Iso-Octyl)-D (Low Volatile)
Technical BEP-D (Low Volatile)

BRUSH CONTROL

Technical Butyl-T • Technical Isopropyl-T
Technical BEP-T (Low Volatile)
Technical 2-Ethyl Hexyl (Iso-Octyl)-T (Low Volatile)

Ready-To-Use Formulations

WEED KILLERS

*4# Mixed Amine-D • 4# Dimethylamine-D
2.67# Butyl-D • 4# Butyl-D • 6# Butyl-D
4# 2-Ethyl Hexyl (Iso-Octyl)-D (Low Volatile)
4# BEP-D (Low Volatile) • 3.34# Isopropyl-D

BRUSH CONTROL

*4# Butyl-T • 4# BEP-T (Low Volatile)
4# 2-Ethyl Hexyl (Iso-Octyl)-T (Low Volatile)
2,4-D—2,4,5-T Mixtures • 2#—2# Butyl Brush Killer
2#—2# 2-Ethyl Hexyl Brush Killer (Low Volatile)
2#—2# BEP Brush Killer (Low Volatile)

*Numbers are pounds of 2,4,5-T or 2,4-D acid equivalent per gallon.

Diamond research is constantly seeking new and better insecticides and herbicides and working with formulators and agricultural chemists in the development of more efficient forms and application methods. We will be glad to work with you. For information on Diamond Chemicals and technical co-operation write, Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND ALKALI CHEMICALS ®

Diamond Chemicals

Report on the new MICHIGAN 12B

Clark's exclusive power-shift transmission

eliminates the most notorious cause of excessive maintenance

No engine clutch, no clutch pedal, no gear clash! Clark's power-shift transmission is standard equipment on the new 15 cu. ft. Michigan Tractor Shovel—completely eliminates this notorious cause of excessive maintenance and down-time.

Instant power-shifting. In place of the conventional gear-shift levers and clutch pedal, the Michigan has a single power-shift lever on the steering column. You can make any shift instantly, even when moving: simply push the lever to High, Low or Reverse position. As any operator will tell you, *it sure beats riding a heavy clutch all day.*

Faster cycles. There's no hesitation, no gear clash, no loss of momentum when you shift—saving seconds or minutes on every cycle. Power-shifting also makes the Model 12B more maneuverable in boxcars and narrow aisles, since you don't have to fumble with conventional levers and clutch pedal.

Heavier, more power. The new Michigan is 20% heavier and more powerful than most machines in its class. With this margin of weight and power, plus low-level independent bucket action, the 12B *digs* where other machines spin their wheels.

See it in action. The complete power train of the new 12B—power-shift transmission, 3-to-1 torque converter and planetary wheel axle—is designed and manufactured by Clark, specifically for the roughest kind of industrial bulk handling. Complete dust protection features are standard; gas or diesel optional. See the new 12B in action, on your own job—write us to arrange a demonstration.

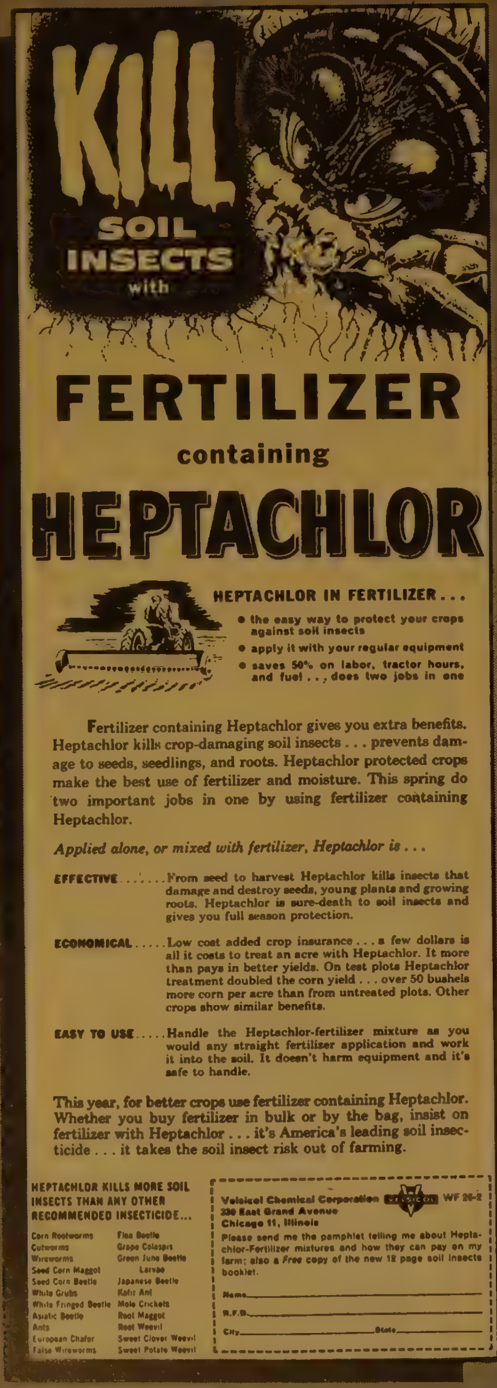
The new Michigan 12B is available on Clark's no-down-payment Lease Plan; clip this coupon to your letterhead and mail it for details.

Michigan is a reg. trade-mark of

CLARK EQUIPMENT

Arrange demonstration of Model 12B:

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2463 Pipestone Road
Benton Harbor 4, Michigan



KILL SOIL INSECTS with FERTILIZER containing HEPTACHLOR

HEPTACHLOR IN FERTILIZER . . .

- the easy way to protect your crops against soil insects
- apply it with your regular equipment
- saves 50% on labor, tractor hours, and fuel . . . does two jobs in one

Fertilizer containing Heptachlor gives you extra benefits. Heptachlor kills crop-damaging soil insects . . . prevents damage to seeds, seedlings, and roots. Heptachlor protected crops make the best use of fertilizer and moisture. This spring do two important jobs in one by using fertilizer containing Heptachlor.

Applied alone, or mixed with fertilizer, Heptachlor is . . .

EFFECTIVE . . . . . . From seed to harvest Heptachlor kills insects that damage and destroy seeds, young plants and growing roots. Heptachlor is sure-death to soil insects and gives you full season protection.

ECONOMICAL . . . . . Low cost added crop insurance . . . a few dollars is all it costs to treat an acre with Heptachlor. It more than pays in better yields. On test plots Heptachlor treatment doubled the corn yield . . . over 50 bushels more corn per acre than from untreated plots. Other crops show similar benefits.

EASY TO USE . . . . . Handle the Heptachlor-fertilizer mixture as you would any straight fertilizer application and work it into the soil. It doesn't harm equipment and it's safe to handle.

This year, for better crops use fertilizer containing Heptachlor. Whether you buy fertilizer in bulk or by the bag, insist on fertilizer with Heptachlor . . . it's America's leading soil insecticide . . . it takes the soil insect risk out of farming.

HEPTACHLOR KILLS MORE SOIL INSECTS THAN ANY OTHER RECOMMENDED INSECTICIDE...

Corn Rootworms
Cutworms
Wireworms
Seed Corn Maggot
Seed Corn Beetle
White Grubs
White Fringed Beetle
Asiatic Beetle
Ants
European Chafer
False Wireworms

Flea Beetle
Grape Colaspis
Green June Beetle Larvae
Japanese Beetle
Kafir Ant
Mole Crickets
Root Maggot
Root Weevil
Sweet Clover Weevil
Sweet Potato Weevil

Velsicol Chemical Corporation WF 26-2
330 East Grand Avenue
Chicago 11, Illinois

Please send me the pamphlet telling me about Heptachlor-Fertilizer mixtures and how they can pay on my farm; also a *Free* copy of the new 12 page soil insects booklet.

Name____________________________
R.F.D.____________________________
City________________State____________

Advertisement now appearing in farm publications

VELSICOL

Everybody is reading about

HEPTACHLOR -FERTILIZER

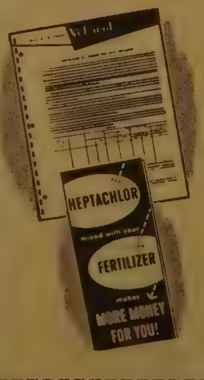
Mixtures

Another PROFIT PLUS for Heptachlor formulators, distributors and fertilizer manufacturers

Over a million farmers are regularly reading about Heptachlor-Fertilizer mixtures in farm magazines and state farm papers. And many more thousands will be hearing the Heptachlor-with-Fertilizer facts on leading farm radio stations. Dealers are reading about this new profit opportunity in *Croplife* magazine and are the target of our strong direct mail program. In addition, Velsicol sales personnel are presenting the Heptachlor story to hundreds of dealers each month.

More farmers will buy Heptachlor for soil insect protection this spring than ever before. They'll ask for Heptachlor mixed with Fertilizer. For greater sales, take advantage of the coming demand for this more effective combination—push Heptachlor-Fertilizer mixtures.

HEPTACHLOR IS AMERICA'S LEADING SOIL INSECTICIDE!



Velsicol Chemical Corporation AC-36
330 East Grand Avenue
Chicago 11, Illinois

Please send me the following without charge . . .

________copies of the sales-aid folder to tell farmers the complete facts on Heptachlor-Fertilizer mixtures.

________copies of Technical Bulletin #504-8 explaining new, simpler, lower cost methods of making Heptachlor-Fertilizer mixtures.

NAME____________________________
COMPANY____________________________
STREET AND NUMBER____________________________
CITY________________ZONE____STATE____________

INDUSTRY News

DuPont Named Diamond Mgr.

George V. DuPont, Diamond Black Leaf Co., Cleveland, was appointed general manager of the firm, it was announced Feb. 7. He succeeds John W. Kennedy, who left the Diamond Black Leaf organization to return to Diamond Alkali Co. as sales manager of agricultural chemicals. Mr. DuPont has been with Diamond Black Leaf since 1940. Subsequent to his appointment he was manager of manufacturing operations of the firm.

•

NCI Completing Expansion

J. E. Totman, president, Northern Chemical Industries, Baltimore, Md., announced recently that NCI's Searsport, Maine, expansion projects are nearing completion. Included in the overall expansion are several integrated units and a new 100 ton per day sulfuric acid contact plant. The expansion project, begun in November, 1954, has increased Northern Chemical's daily production of synthetic sulfate of ammonia, used in both industry and agriculture.

•

New Chipman 2,4-D Plant

Chipman Chemical Co., Inc., Bound Brook, N. J. has announced the immediate construction of a 2,4-D plant adjoining the company's district office and factory at Portland, Oregon.

The new 2,4-D plant will produce a complete line of 2,4-D and 2,4,5-T weed killers for consumer use, as well as 2,4-D acid and technical ester forms of 2,4-D and 2,4,5-T, including the low volatile esters.

2,4-D acid and technical esters manufactured at Portland will be shipped to one of the company's three midwest plants; then formulated into the various finished products. Thus, the company will expand its service to midwest grain growers and other users of 2,4-D and 2,4,5-T weed killers in that section of the country.

•

Corp. for Plant Food Services

Plant Food Services, St. Johns, Mich., recently incorporated for $96,000 and elected new officers. They are: Clayton Klein, president; Donald Irrer, vice president; Norman Irrer, secretary treasurer. Bert A. McNeilly is general manager.

Bulk storage and handling facility expansion are planned.

•

Shell Moves to New Orleans

Shell Chemical Corp., New York, has moved its agricultural chemicals sales division from its recently consolidated district in Jackson, Miss., to New Orleans. J. F. White continues as district manager. The company is maintaining its area office in Houston under the supervision of A. J. Garon. The consolidated district now covers a seven-state area.

•

PEC Fertilizer Plant

Louis E. Andres, technical director of Potasse & Engrais Chimiques, Paris, France announced recently the completion of a contract between his company and TYPPI O/Y, Oulu, Finland for the erection of a complex fertilizer plant using the patented PEC carbonitric process for producing 13-10-13 grade fertilizer. The capacity of this plant is 400 tons per day and Kola phosphate rock will be used as a raw material along with potassium chloride that is to be imported from Germany.

The Chemical and Industrial Corp., Cincinnati, Ohio has the exclusive right to license the PEC process in the United States, Canada, and other parts of the world. They designed the plant for Formosa, and designed and are constructing the plant for California Spray-Chemical Corp. at Richmond, Calif.

•

Belgian Pesticide Rep. in U.S.

André Paquot, export sales manager of S. A. Sels et Produits Chemiques, Brussels, Belgium, has been visiting the U. S. these past two months with a view to establishing personal contacts with U. S. manufacturers of pesticides. A fully-owned subsidiary of Solvay et Cie (Belgium), S. A. SELCHIM operate a large formulating plant in Neder-over-Heembeek, Belgium, from where they supply users in Belgium, Belgian Congo and many overseas territories with insecticides, weedkillers and fungicides.

•

New Insecticide Plant in South

The location of a new insecticide plant in Aberdeen, N. C., is announced by H. Blue, president of the Aberdeen & Rockfish Railroad Co. Mr. Blue said Olin-Mathieson Chemical Corp., will manufacture a complete line of insecticides at the plant to serve a large territory in North and South Carolina. The plant is expected to begin operations within 30 days.

•

W. Prod. Conf. in Fresno

Cotton growing problems will be considered from the standpoint of increased efficiency and reduced cost in the far west, when the fifth annual Western Production Conference meets in Fresno, Calif., March 6-7. Headquarters for the meeting will be the Fresno Hacienda.

The National Cotton Council is co-sponsoring the meeting in cooperation with Southwest Five-State Growers Association and other Western producer groups.

As in previous years, the conference will consider latest research developments affecting soil fertility, disease control, irrigation, weed control, insect control, defoliation and needs for improving and preserving lint quality.

Stauffer Fertilizer Plant in Prod.

The first shipments of pelleted mixed fertilizer have been made from Stauffer Chemical Co.'s new plant at Vernon, Calif. Initial production and shipments were of 17-7-0. Current plans contemplate the regular production of 5-15-0, 10-10-5, 10-10-10 and other special mixtures, as well as pelleted single superphosphate.

The plant employs a process of manufacture developed by the company's research engineers.

•

Ky. Fertilizer Conference Aug. 1

The 1956 annual Kentucky Fertilizer Conference is scheduled for August 1, in the Guignol Theatre, University of Kentucky, Lexington.

Program details for this meeting will be announced at a later date.

•

Nitro. Div. Makes New Product

Nitrogen Division, Allied Chemical & Dye Corp., announced late last month that it will install at its Hopewell, Va., plant facilities for the production of ammonium nitrate 33½%. This new addition to Nitrogen's line of products is expected to be in production late in 1956.

•

Nicholson Leaves Union Bag

Union Bag & Paper Corp., early last month announced the resignation of G. W. Nicholson as executive vice-president to accept the presidency of Tennessee River Paper Co., newly organized firm which will build a large kraft pulp and paper mill in the south.

•

ICC Proposal Opposed

Paul T. Truitt, executive vice president of the National Plant Food Institute, Washington, D. C., said last month that granting of a proposed 7% freight rate increase by the Interstate Commerce Commission "would impose an insurmountable hardship on farmers and the fertilizer industry."

The Institute has filed with ICC a protest and request for suspension of increased freight rates on fertilizer and fertilizer materials.

New Chemical Co.

C. P. Stephenson, College Park, Ga., has organized the Stephenson Chemical Co. which is specializing in the manufacture of dry agricultural insecticides. The firm's trade name products include "Drop Dead Bug Killer" and "Perk Up Fungicides."

•

Clark Opens New Center

Clark Equipment Co., Battle Creek, Mich., announced recently the opening of its new materials handling development center. The center was established to develop materials handling methods for individual industries.

•

U.S. Potash Names Wilson

U.S. Potash Co., New York, announced Feb. 7 that W. W. Wilson joined the company as midwestern sales representative. For the past seven years he has been with the Farm Bureau Cooperative Association, Columbus, O., serving part of that time as director of purchasing.

•

Hutchinson Name to Board

Election of William J. Hutchinson as a director of the American Potash and Chemical Corporation to fill the vacancy left by the late William J. Murphy was announced last month by the firm. Mr. Hutchinson has been a director of the International Nickel Company of Canada, Ltd., since 1924.

Atlas Advances Caruso, Stubbe

Atlas Powder Co., Wilmington, announced the appointment of E. John Caruso as assistant manager of its chemical division regional sales office in Chicago. Formerly technical representative in the company's St. Louis, Mo., sales office, Mr. Caruso will serve in the newly-created post as assistant to Howard W. Dellard, manager of the Chicago office.

Paul E. Stubbe, technical representative in Atlas' chemical sales office in Dallas, Tex., has been transferred to St. Louis to succeed Mr. Caruso.

From the Photo Box

Pictures taken at the recent meeting of the American Phytopathological Society in Atlanta, Ga.

(1) W. D. Valleau, Univ. of Kentucky, Lexington; and F. O. Holmes, Rockefeller Institute, N. Y.

(2) C. E. Yarwood, Univ. of California, Berkeley; S. E. A. McCallan, Boyce Thompson Institute, Yonkers, N. Y.

(3) A. Frank Ross, Editor in Chief, Phytopathology Cornell Univ.; J. G. Dickson, former president A.P.S., Univ. of Wisconsin; and Karl Maramorosch.

(4) Paul R. Miller, vice president A.P.S., USDA, Beltsville, Md.

(5) G. S. Pound, Secretary A.P.S., Univ. of Wisconsin; and Lindsay M. Black, Univ. of Illinois, Urbana.

(6) W. D. McClellan, USDA, Beltsville, Md.

(7) A. E. Dimond; Paul Waggoner; and Saul Rich, treasurer of A.P.S.; all of Connecticut Agr. Exp. Sta., New Haven.

Mississippi River Ships Ammonium Nitrate

First shipment of ammonium nitrate solution from the new $16,000,000 Selma, Mo. plant of Mississippi River Chemical Company, a division of Mississippi River Fuel Corp., St. Louis. In the photo (l to r) are John L. Sanders, sales manager of Mississippi River; James W. Mathers of Bradley & Baker, St. Louis; Cecil Lashlee, plant manager, and R. G. Powell, technical service director of Mississippi River.

Ohio-Indiana Aviation Conf.

The fifth annual Ohio-Indiana Agricultural Aviation Conference was scheduled to be held Feb. 22-24 at Ohio State University, Columbus, Ohio. Sponsors of the event are the Ohio Aviation Board, Indiana Aeronautics Commission, Ohio and Indiana Aerial Applicators, Ohio & Indiana Agricultural Extension Services, Ohio & Purdue Agricultural Experiment Stations, and Ohio State and Purdue Universities.

At the opening session J. J. Davis was scheduled to speak on "What Applicators Should Know About the Miller Bill." Continuing on the program Irvin Mount was to discuss "Economics of Plane vs. Ground Applications," and Riley Dugan was to speak on "Agricultural Outlook as it May Affect Aerial Application in 1956. A film, "Agricultural Aviation" was to be shown.

C. R. Weaver and R. T. Everly were to speak Feb. 23 on "Legume Insect Control with Granular Insecticides." M. G. Farleman was also to speak on "New Insecticides and Care in Handling." The following topics and speakers were also scheduled: "Developments in Brush Control" by C. J. Willard; "Principles of Crop Fertilization" by John Parsons; "Airplane Seeding of Legumes and Cover Crops" by Edmund Huffman, W. W. Snyder and Lloyd Anderson; "Disease Control Experiment on Potatoes" by C. R. Neiswander, and "Applicator Insect Problems" by a panel.

The last day of the conference was to be devoted to a demonstration of planes and equipment in addition to a discussion of the following topics: "Corrosive and Solvent Action of Agricultural Chemicals on Applicator Equipment" by D. T. Black; "Experiments in Aerial Application of Granular Materials" by Orve K. Hedden; "Metering and Distributing Equipment Studies with Dry Materials" by James Henry, and "Sprayer Installation on the Ohio Project" by Charles Kellenbarger and James Henry.

•

CFA Fertilizer Handbook

The Soil Improvement Committee of the California Fertilizer Association reports continuing public demand for its *Western Fertilizer Handbook*, 2nd edition. Earle J. Shaw, Los Angeles, chairman of the handbook sub-committee, advised the committee at a recent meeting that prepaid orders are being directed to the Association office every day from various parts of the world.

Shaw said that this widespread interest is appreciated and that it will necessitate publication of a third edition somewhat in advance of original plans. He pointed out that no change had been made in the text of the second edition, and that no major changes are contemplated for a third edition unless important alterations are made meanwhile in the chemical designations of the principal plant food elements, or other important advances are made which cannot be visualized at present.

The "Handbook" is a reference work reviewing soil fertility and plant nutrition. It contains 160 pages and features twelve color plates, most of which depict plant food deficiency symptoms, and many black and white illustrations.

•

Parsons Appointed Plant Mgr.

James A. Parsons, Klein Soil Service, Fowlerville, Mich., was appointed plant manager recently, succeeding Robert W. Parsons, who purchased the bulk spreading trucks and nitrogen solution business from Klein. A new bulk conveying system will be capable of increasing production from the present 6 tons to over 70 tons per hour.

•

Benson Addresses Canners

Secretary of Agriculture, Ezra Taft Benson, delivered the keynote speech Jan. 21 at the 49th annual convention of the American Canners Association at Atlantic City, N. J. Mr. Benson said "The progress in nutrition that we have made is the joint product of millions of Americans working together—under our system of free enterprise."

At the two-day convention, Jan. 20-21, Dr. Frank P. Cullinan, chief of Horticultural Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture, spoke on the cause of widespread losses of crops due to nematodes. He said that microscopic pests affect crop production not only directly, but also indirectly by increasing susceptibility to other soil-borne organisms or by introducing them.

E. G. McKibben, Agricultural Research Service, spoke on fertilizer application and placement, weed control equipment and spraying and dusting equipment.

The convention also heard an address by W. W. Pate, assistant, Soil and Water Conservation Research Service, USDA.

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DIPTEREX will be available to distributors for the 1956 season in ten pound metal pails packed four to a case and in one pound canisters packed twelve to a case.

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L. J. Polite

John W. Kennady

Diamond Names Polite, Kennady to New Executive Posts

L. J. Polite, Jr., agricultural chemicals sales manager, Chlorinated Products Div., Diamond Alkali Co., Cleveland, was appointed product sales manager early last month. He succeeds W. B. Beeson, Jr., recently named manager of Diamond's New York-New England branch sales office in New York City.

John W. Kennady, general manager of Diamond Black Leaf Co., an affiliate of Diamond Alkali, succeeds Mr. Polite as sales manager of Diamond agricultural chemicals.

A veteran of 14 years with Diamond, Mr. Polite joined the company as a sales representative in 1942. He became agricultural chemicals sales manager in Jan. 1954, the position he now leaves to become product sales manager.

Mr. Kennady has a broad background in agricultural chemical sales and engineering fields dating back to 1932. He was formerly with the U. S. Department of Agriculture and spent a nine-year span in government service. In Feb. 1955 he was appointed general manager of Diamond Black Leaf Co.

La. '56 Program on Cotton Pests

Kirby L. Cockerham, extension entomologist, Louisiana Agricultural Experiment Station, Baton Rouge, La., recently issued the following recommendations for the cotton insect control program in Louisiana for 1956.

Methyl parathion has been added to the insecticides that are being recommended for cotton insect control in 1956. This material as a dust is recommended for use as follows:

(1) For boll weevil or boll weevil, boll worms and spider mites (Under Section B): Calcium arsenate may be alternated with 5 per cent methyl parathion plus 5 per cent DDT at 10 to 15 pounds per acre; or, the methyl parathion — DDT mixture may be used in successive applications.

(2) For spider mite control, 5 per cent methyl parathion dust at 7 to 10 pounds per acre is recommended.

(3) For cotton aphid control 5 per cent methyl parathion dust at 7 to 10 pounds per acre is recommended.

Methyl parathion in sprays is recommended as follows:

(1) For boll weevil or boll weevil and boll worms, .5 pounds methyl parathion plus .5 pounds DDT is recommended.

(2) For spider mites, .25 pounds technical methyl parathion per acre is recommended.

(3) For cotton aphid control .25 pounds technical methyl parathion per acre is recommended.

Methyl parathion is effective for control of the boll weevil, cotton aphid, cotton leaf worm, and spider mites. It will not control boll worms. When boll worms are present, DDT has to be added.

●

St. Regis To Exchange Stock

St. Regis Paper Co., New York, announced recently it intends to make an offer of exchange of St. Regis common stock for Rhinelander common stock on a share for share basis. The exchange offer will be made promptly after St. Regis files with the Securities and Exchange Commission.

●

Am Potash Ends Trona Rep.

Peter Colefax, president of American Potash and Chemical Corp., Los Angeles, and Wilson Meyer, president of Wilson & George Meyer & Co., announce that by mutual agreement, the long standing arrangement under which the Meyer firm has represented American Potash & Chemical Corp. in the sale of "Trona" agricultural potash, borax, soda ash and salt cake in various western sales areas will not be renewed upon its expiration in mid-1956.

The expansion of American Potash & Chemical Corp. in its field of manufacturing and the added responsibilities of the Meyer Company in its field of distribution have resulted, in recent years, in the development of divergent interests. Both parties therefore arrived at the mutually agreeable decision to sever their old relationship.

●

Union Bag Announces Changes

Union Bag & Paper Corp., New York, announced in late January three changes in territorial administration. C. M. Campbell, former southeastern sales representative, will handle multiwall bag sales in Minnesota, and North & South Dakota. F. M. Whittaker transferred his headquarters from Minneapolis to Chicago where his sales territory includes Iowa, western Illinois and part of Chicago. A. J. Sohmer, former midwestern sales representative, will handle sales in Delaware, Maryland, Virginia and part of West Virginia.

NOW IN OPERATION—GAF'S NEW PLANT FOR HIGH PRESSURE ACETYLENE DERIVATIVES

the story behind the headline

For those of you who have not been eating, sleeping and breathing high pressure acetylene reactions as we have, a brief reminder on the background of these products may be in order. In the early 1930's, Dr. J. Walter Reppe, working in Germany, licked the previously "impossible" problem of handling acetylene efficiently and safely at high temperatures and high pressures in chemical syntheses. This led him and his group into varied investigations which resulted in the synthesis of numerous chemicals which had previously been completely unknown, or at best only obtainable by elaborate and expensive reactions.

Even though widespread work in this field has continued steadily up to the present, and the laboratories of General Aniline in this country have been engaged in their own independent research for more than ten years, vast and challenging areas of research still remain for exploration in the new branch of chemistry involving high pressure acetylene reactions.

When the GAF laboratories began synthetic work in the new field, none of the products they turned out had ever been available in the U.S. in commercial volumes and at commercial prices. We, therefore, found it necessary to do some rather fancy, long-range extrapolating from the physical and chemical properties of all of the products to their potential applications and sales volumes in order to decide which would be of greatest immediate industrial value. Following these decisions came sales development, application research, and process development in the laboratory and pilot plant. Finally, the plant stage has been reached for the first group of products now to be made at GAF's new Calvert City plant.

They are a related series resulting from the reaction of acetylene with formaldehyde to yield a mixture of butynediol and propargyl alcohol. In a relatively brief time they have developed an astonishing and, we must confess, in part unexpected range of applications about which GAF's Commercial Development Department has told you in advertisements, data bulletins and personal visits. Along with the large new plant now also comes a new, full-scale sales department eager to help you use these products to your best advantage.

We expect to be reporting the commercialization of many more high pressure acetylene derivatives in the future, but no announcement will have quite the significance of this first one, both for you and for us. We believe it represents a milestone for our industry: the first of many commercial high pressure acetylene derivatives plants in the United States.

PRODUCTS TO BE AVAILABLE FROM GAF's NEW PLANT AT CALVERT CITY, KENTUCKY:

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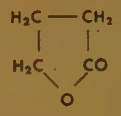
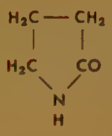
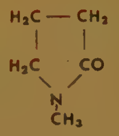
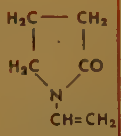
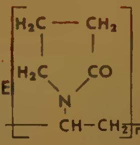
1,4-BUTANEDIOL	$HOCH_2CH_2CH_2CH_2OH$	BUTYRO-LACTONE	
2-PYRROLIDONE		N-METHYL-2-PYRROLIDONE	
N-VINYL-2-PYRROLIDONE		POLYVINYL-PYRROLIDONE (PVP)	

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From Research to Reality

AS WE GO TO PRESS . . .

Western and California Weed Control Conference

By Charles Starker

Newly elected officers, Western Weed Control Conference: President Henry Wolf, Ext. Weed Specialist, Washington State College, Pullman, Wn. Vice-president, R. A. Fosse, American Chemical Paint Co., Denver.

A CAPACITY crowd of nearly 600 thronged Governor's Hall, California State Fairgrounds, Sacramento, Calif., February 15 and 16 for the first two days of the three-day joint meetings of the Western and California Weed Conferences. On February 17th, an estimated 300 to 400 interested research, industry, and farmer participants viewed displays of the newest type weed control equipment at University Airport, Davis, Calif.

National, International Picture

"It is essential for the farmer faced with today's high costs of production, to have a lower cost of operation," NAC president W. W. Allen, Dow Chemical Co., Midland, Mich., told the group. "The intelligent use of pesticides will aid in the quality and quantity of farm production." Speaking on the side-effects of the Miller Bill, Mr. Allen stated "Public interest is currently focused intently on the agricultural chemical industry, with a broader public awareness of its contributions; thus helping more farmers benefit, producing more sales for industry, more importance and recognition for federal and state research workers; and building a more solid public confidence. . . . Pesticide labels have won due respect, and are under closer scrutiny than ever before." In speaking of residues from weed killers, Mr. Allen suggested that there would be no real problems from the standpoint of residues, "so at the moment, herbicides look good under the Miller Bill."

"Weed control problems in the 11 western states are all quite similar," Henry Wolf, extension weed specialist, WSC, Pullman, Wn. stated. Weeds in wheat are responsible for an annual 22 million dollar loss. Mr. Wolf presented some interesting figures on amounts of weed seeds found in the drill boxes of farm seeders where uncertified seed was used. "One way tc control weeds is not to plant them," Wolf told the group. Studies on debris in irrigation systems showed at least 40% was weed seeds."

"US 'know how' and assistance has been of great aid in the continual battle against weeds in New Zealand," Dan Watkins, of New Plymouth, New Zealand stated. Their weed problems are similar to those in this country — Blackberry, Gorse, Sweet Briar, Nassella Tussock, and Canadian Thistle being some of the major ones. The reduction in the rabbit population in southern New Zealand has resulted in an increase in the Sweet Briar problem. The use of polyethylene esters of 2,4,5-T in water or oil has been highly effective against sweet briar. This chemical is employed in emulsifiable formulations in water, being applied by air at the rate of 30 imperial gallons per acre in a single pass. New land is being brought under cultivation at the rate of 50,000 acres per year. Weedkillers, insecticides and fertilizers are playing an important part in this development" Watkins concluded.

"Some day, we may be able to write a prescription for chemical weed killers just as we now balance a feed ration according to nutrient requirements, or plan a soil-building program on the basis of a soil test. Tailor-made weed killers, designed to fit specific conditions, now seem possible as research workers extend their knowledge of the family of substituted urea compounds, Dr. A. E. Carlson, E. I. DuPont Co., Wilmington, Del., stated. "USDA studies indicate that in such row crops as cotton, onions, potatoes, sugar beets and dry beans, hand-weeding, hoeing and cultivating take up to 80 percent of pre-harvest man-hours in crop production. There is considerable challenge to cut this kind of labor investment, and chemical weed killers look like one good way to do it." Dr. Carlson concluded.

"Canada's annual weed bill is estimated at 468 and a half million dollars, E. G. Anderson, Secretary, Canadian National Weed Committee, told the group. "Wild oats are the ranking problem in western Canada, and infest 75% of the seeded acreage to some extent."

Western Conditions

"Economic losses due to weeds in the U. S. are estimated to run about four billion dollars per year, and in California at well over 200 million," W. C. Jacobsen, California Director of Agriculture, stated. "Although California produces some 220 different crops, weeds also flourish under her climate and a 12-month weed control problem is necessary. In the early days, people had to be urged to use weed killers; now this

General view of equipment displayed at University Airport, Davis, Calif. during the joint Western and California Weed Conferences.

activity must be restricted at times to prevent crop and property damage." Jacobsen concluded.

What's New In Weed Control

Wednesday evening's panel discussion on this topic included eleven technical representatives from Industry. Herbicides discussed included: Amino triazole; Chlorate-urea combinations; Borate-urea and borate-2,4-D combinations; Erbon (Baron); Dalapon; Telvar W, DW — Karmex W, DL & FW; HC-1281 (Heyden Chemical Co.); Dichloralurea; Vapam; CDEA, CDAA and CDED; Geigy compound 444.

New Frontiers For Weed Control

"There are 100 million acres of vegetation control problems in California," W. A. Harvey, extension weed specialist, University of California, Davis stated. Half of California is barren or forested area. At the present time there are three million acres in highway rights of way, industrial and urban areas — coming out of good agricultural land. Other areas of the state will have to be "upgraded" to take the place of this valuable land. Weed killers will have an important part to play in this program." Harvey concluded.

"The farmer is discouraged from using weed control chemicals by the multitude of regulations — permits, insurance, etc. in California. Why regulate, when it is wiser to educate than legislate?" asked C. M. Gordon, a rancher from Woodland, Calif. Pesticide use should not be smothered. Chemical companies have gone "hog wild" on trade names for their products, Gordon continued. "If the farmer changes brands of 2,4-D, he has a terrible time figuring 2,4-D acid content. The farmer is behind the economic "8 ball," he can't pass on his increased costs to the consumer—as does the manufacturer of weed control chemicals. Thus he must be able to see where the use of these materials will put money in his pocket. The past 15 years have brought many advances in weed control materials; and the next 15 will see many more. It is hoped that these can be new and useful tools for the farmer, and that they won't be legislated out of his use." Gordon concluded.

"Irrigation systems have a big job in weed control," O. L. Fudge, Imperial Irrigation District, Imperial, Calif. told the group. Weed control is a major operation. Burning, spraying with contact oils and use of chemicals for control brings the annual cost to about one-half million dollars a year. The use of chemical weed killers has enabled them to shut down equipment for a 60 day period each year for overhaul. Prior to this time rigs were run constantly so they could "hold their own." Now intelligent use of new chemicals has made it possible to begin an offensive war against weeds." Fudge said.

"Rice farmers have found 2,4-D to be a rather inexpensive and successful method of controlling weeds, but 2,4-D has caused some damage to the rice plant," A. H. Williams, South Dos Palos, California said. MCP has been found to be more selective than 2,4-D and should be applied 55 to 60 days after planting. Where it is not possible to use 2,4-D, because of near-by susceptible crops, good cultural practices eliminate most of the serious weed problems. Recent work with Silvex and 2,4-DP indicate some possibility in this respect. In at least one area in California a general type contact spray has been successful in combating lilies." Williams concluded.

Next meeting of the Western Weed Conference is to be held in Spokane, Washington in February, 1958. It was decided at the business meeting to keep the meetings on a bi-annual basis as in the past. Officers elected were: president, Henry Wolf. Extension Weed Specialist, Washington State College, Pullman, Wn.; vice-president, R. A. Fosse, American Chemical Paint Co., Denver, Colo.; and secretary, W. R. Furtick, Farm Crops Dept., Oregon State College, Corvallis, Ore.

Officers for the California Weed Conference elected for 1957, are president J. W. Koehler, State Dept. of Agriculture, Los Angeles; vice-president Verne Cheadle, Univ. of Calif., Davis; secretary, Oliver Leonard, Univ. of Calif., Davis; treasurer J. T. Vedder, AFC, Inc., Bakersfield, Cal. The California Weed Conference will meet January 22 to 24, 1957.

Committees which aided in planning this very successful convention included Publicity — Murray R. Pryor, State Dept. of Agriculture, Sacramento; Entertainment, Ed Littooy, Colloidal Products Corp., San Francisco; Exhibits, Bob Moore, Jr. Orchard Supply Co., Sacramento. Officers of the Western Weed Control Conference for 1956 were president Walter S. Ball, State Dept. of Agriculture, Sacramento, Cal.; vice-president W. A. Harvey, UC, Davis; secretary-treasurer, W. C. Robocker, ARS, USDA, Reno, Nevada.

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To Raise Kraft Price

St. Regis Paper Co. announced Feb. 23rd that effective March 1 the price of bleached and unbleached kraft paper would be advanced by $10 a ton. A similar price advance had been announced a few days earlier by West Va. Pulp and Paper Co.

Arkansas Fertilizer Plant

The National Farmers Union, Little Rock, Ark., has voted to build a multi-million dollar agricultural chemicals and fertilizer plant in Arkansas. Possible sites in Camden, Helena and El Dorado are under consideration. The new plant, one of five to be built in various sections of the country by NFU, was originally scheduled to be located in Georgianna, Ala.

•

Molybdenum-Containing Fert.

Davison Chemical Co., Div. of W. R. Grace & Co., Baltimore, has recently incorporated the trace element, molybdenum, in one of its fertilizers, one of the first such commercial products to be sold in the U. S. The product is called "Nurish," a water-soluble high concentration (20-20-20) fertilizer, which has been on the market for about three years.

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Hercules Advances Executives

A series of executive changes in the Naval Stores Department of Hercules Powder Co., Wilmington, was announced February 23rd by Paul Mayfield, general manager. P. J. Reno, with the Dallas office for the past six years, has been made sales manager of the Agricultural Chemicals Division. Richard J. Both, who has been sales manager of the Agricultural Chemicals Division, becomes manager of the Chicago District Office. Allen C. Gunter succeeds Mr. Reno as manager of the Dallas office, and L. E. Anderson who has been manager of the Chicago office now becomes sales manager Oxychemicals Division.

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Cal. Fert. Assn. Meets Nov. 11

William E. Snyder, president of the California Fertilizer Association, has just announced that the 1956 convention will be held November 11-13 at the del Coronado Hotel, Coronado, Calif. The program committee in charge of this 33rd annual meeting will include Frank Scoville, Chula Vista, Chmn., Howard Conley, Los Angeles, and Thomas H. Lathe, Los Angeles.

General Chemical Releases Film

General Chemical Div., Allied Chemical & Dye Corp., New York, announced Feb. 28 the release of a color sound-slide film entitled "Green Pastures." The 45 minute film gives the latest information on profitable practices in modern pasture management.

•

New Plant In Operation

Stauffer Chemical Co., New York, recently began production of agricultural chemicals at its new Gibson Industrial District plant in Omaha. The plant is making a full line of liquid insecticides, fungicides, miticides and herbicides. It is also manufacturing grain fumigants.

•

Ashcraft Names Richardson

Ashcraft-Wilkinson Co., Atlanta, Ga., last month opened a branch office in Montgomery, Ala., with Thomas W. Richardson as manager. Mr. Richardson was a sales representative for the Nitrogen Div., Lion Oil Co., for several years. His office in Montgomery will serve Alabama and Northwest Florida.

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Carbide To Market DCU 73W

Carbide and Carbon Chemicals Co., New York, developer of Crag DCU 73W, announced that the new chemical grass weed killer is available to sugar beet growers in commercial quantities. DCU, a wettable powder, will be sold in 50-pound drums and 2½-pound bags. Cost to the farmer will be about $3.33 per acre, according to M. J. Siciliano, Crag sales manager.

•

Am. Potash Plans New Offices

American Potash & Chemical Corp. announced plans to set up district sales offices this month in San Francisco and Portland. The San Francisco office will handle sales in northern and central California, Nevada, Utah and Colorado. The Portland office will cover Oregon, Washington, Idaho, Montana, Wyoming and British Columbia.

NEW ALABAMA ASSN.

(*From Page 70D*)

specifically for forest pest control, and for improved portable spray equipment to suit requirements of small timberland owners.

The imported fire ant, has spread to some 26 counties in Alabama since it was first reported in 1930, observed G. H. Blake, API, in a report on experiments to control this pest. As a result of these experiments, he said, tentative recommendations for control of imported fire ant include: 2 pounds of dieldrin or heptachlor or four pounds of chlordane per acre applied as a broadcast application are recommended for control. The materials may be applied as sprays, granules, or in fertilizer mixtures.

F. I. Jeffreys, API, discussing control measures for sweetpotato weevil and white fringed beetle, reported that USDA research describes use of dieldrin as an effective control for sweetpotato weevil. Previous to these findings, he said, only cultural practices, fumigation and abstinence from planting sweetpotatoes were recommended as a control and possible means of eradicating the sweetpotato weevil.

The most effective control of the white fringed beetle said F. I. Jeffreys is obtained by applying insecticides to the soil either broadcast treatment, as a surface treatment, or as an insecticide fertilizer mixture: aldrin, dieldrin, DDT, chlordane and heptachlor are recommended as soil insecticides for the white fringed beetle.

In the last five years, a keen interest has developed in the use of antibiotics for the control of plant diseases, remarked U. L. Diener, API, "Antibiotics are only now emerging from the research to the commercial production stage, and they offer hope in combatting previously almost uncontrollable diseases." At present, there are 3 commercial products on the market: Agrimycin, Agristrep, and Actidione. They have been used successfully for controlling seed borne diseases by seed treatment.

"Once a large potential use of antibiotics is assured," he remarked, "American industry through mass production will bring forth antibiotics at prices low enough for general agricultural use. At this time, disease control is practical only with high value crops, such as fruits, vegetables, and ornamentals."

Chemicals are being widely used to eliminate undesirable species of trees and increase growth and quality of desirable types, G. Garin, Experiment Station forester, stated. He explained that ammate is an effective chemical when applied in chopped cups 6 inches apart at the base of trees, but hickories require two applications.

Max R. Osburn, entomologist, Entomology Research Branch of ARS, Albany, Ga., discussed the most important insect pests that attack pecan trees, and materials recommended for their control.

R. B. Deen, district agent, Fish and Wildlife Service at State College, Miss., advised that care be used in selecting rodenticides that will be effective and safe to use. Warfarin, pival, fumarin, red squill, zinc phosphide, and arsenic trioxide are recommended for public use, he said.

There is increased concern about rodent control relating to grain sanitation. After July 1, Mr. Deen said, the Pure Food and Drug Administration will have stricter requirements against rodent contamination of wheat.

Some of the most important stored product pests in Alabama are the rice weevil, the grain, flour and meal moths, the flour beetles, cadelle, cigarette beetle and saw-toothed grain beetle. The rice weevil and grain moths often infest grain in the field and are carried over into storage. Corn varieties with long, tight husk covers suffer less damage from these insects than those with poor husks.

For spraying bins, use 2.5-5% DDT, TDE, or methoxychlor emulsions or water suspensions applied at the rate of 2 gals. per 100 square feet of surface area. The following fumigants are recommended for killing insects present in bins in products in storage:

1. methyl bromide applied at the rate of 1 to 15. pounds per 1000 cubic feet of space
2. ethylene dichloride and carbon tetrachloride (3-1 mixture) applied at the rate of 5-7.5 gals. per 1000 cubic feet
3. A 4-1 mixture of carbon tetrachloride and carbon disulfide

In discussing the question of resistance developing in household pests, R. M. Russell, Orkin Exterminating Co., Atlanta, advised that continued use of the same or related insecticides kills off all but a few individuals. Still another factor, he said, is that certain insects, such as flies are able to change DDT into relatively harmless DDE (ethylene derivatives of DDT). As to control, he announced that the present outlook tends to favor the use of the chemically different organic phosphates for resistant insect control. Because of shorter residual control usually encountered with organic phosphates, it is most important that more thorough selection be accomplished.★★

SOIL IMPROVEMENT CONF.

(*From Page* 49)

significance to the entire industry was indicated by the fact a capacity group stayed for this event.

Purpose of the session was to give implement manufacturers and their engineers the farmer's outlook on the shortcomings of present application equipment, and what might be done to better adapt such machines to today's farm requirements.

In the first of two panel discussions M. D. Sanders, director of research, plant food div., Swift & Co., talked about the relation of present equipment to solid fertilizers. R. B. Ellsworth, president, Ellsworth Equipment & Engineering Co., Indianapolis, Ind., reviewed the status of applicators for complete liquids. J. D. Cook, fertilizer div., Illinois Farm Supply Co., Chicago, in his report, dealt with bulk spreading, and the final panelist Dr. A. J. Ohlrogge, associate professor of agronomy, Purdue Univ., Lafayette, Ind., discussed fertilizer placement.

A discussion . . . questions and answer period . . . open to the general audience was directed to a panel consisting of Vincent Sauchelli, chief agronomist, Davison Chemical Corp., Baltimore, Md.; Dr. George Scarseth, director, American Farm Research Association, Lafayette, Ind.; R. P. Thomas, technical service advisor, plant food div., International Minerals and Chemical Corp., Chicago, and Dr. George E. Smith, Prof. of Soils, Univ. of Missouri, Columbia, Mo.

The discussion of the questions fired at this panel range far and wide and space is available only to indicate its scope by listing a few of those questions, such as:

Has any manufacturer ever gone out in the field and tried to put a bag of fertilizer into the equipment he makes? How uniform is the fertilizer product? What will be the pattern of distribution — Broadcast or in the row? What is the possibility for combining fertilizer application with other operations? What are the factors favoring liquid and solid fertilizers? Can liquid fertilizer be spread evenly and uniformly by gravity? How can liquid fertilizers compete with high concentrate dry forms? What is the comparison of costs between liquid and solid fertilizers with the same amount of actual analysis plant food? Etc., etc.

Another conference feature was a "picture show" in which films produced by the Univ. of Wisconsin, American Potash Institute, and the National Plant Food Institute were shown. One observer commented that this "show" verified the old Chinese adage that "A picture is worth 10,000 words."

W. M. Newman, Price Chemical Co., Louisville, Ky., and president of the Middle West Soil Improvement Committee, welcomed visitors at Thursday's opening session then turned the meeting over to the program chairman, Prof. Kermit Berger, Univ. of Wisconsin. D. A. Williams, general manager, Minnesota Farm Bureau Service Co., St. Paul, Minn. was moderator of Friday's mechanization conference.★★

CSC Expands in South

In a move to expand its marketing and distribution organization for agricultural chemicals in the South, Commercial Solvents Corp., New York, last month named Massey K. McConnell Southern district sales manager with headquarters at Sterlington, La. CSC's Sterlington plant produces granular ammonium nitrate, aqua ammonia, nitrogen solutions and anhydrous ammonia.

W. M. Hemeter M. K. McConnell

William M. Hemeter was appointed to the CSC southern district sales organization. For the past 20 years Mr. Hemeter has been engaged in fertilizer production and sales.

CSC's southern district includes: Arkansas, Louisiana, Mississippi, western Tennessee, Texas and Oklahoma.

•

Olin-Mathieson Suit Dismissed

A $280,000 damage suit filed in U. S. District Court last April by the Arkansas Plant Food Co., charging Olin-Mathieson Chemical Corp., with violation of the Robinson-Patman Act, has been dismissed by Federal Judge Harry J. Lemley. The North Little Rock firm had charged Olin-Mathieson with forcing Arkansas Plant Food Co., to pay higher prices for superphosphate than those charged other customers.

Dismissal was docketed "with prejudice," which precludes re-filing of the charges.

S. L. Nevins, vice president of Olin-Mathieson and head of the company's newly consolidated Eastern and Western Fertilizer Divisions with headquarters at Little Rock, declared that Olin Mathieson had been vindicated of the price-fixing charge.

•

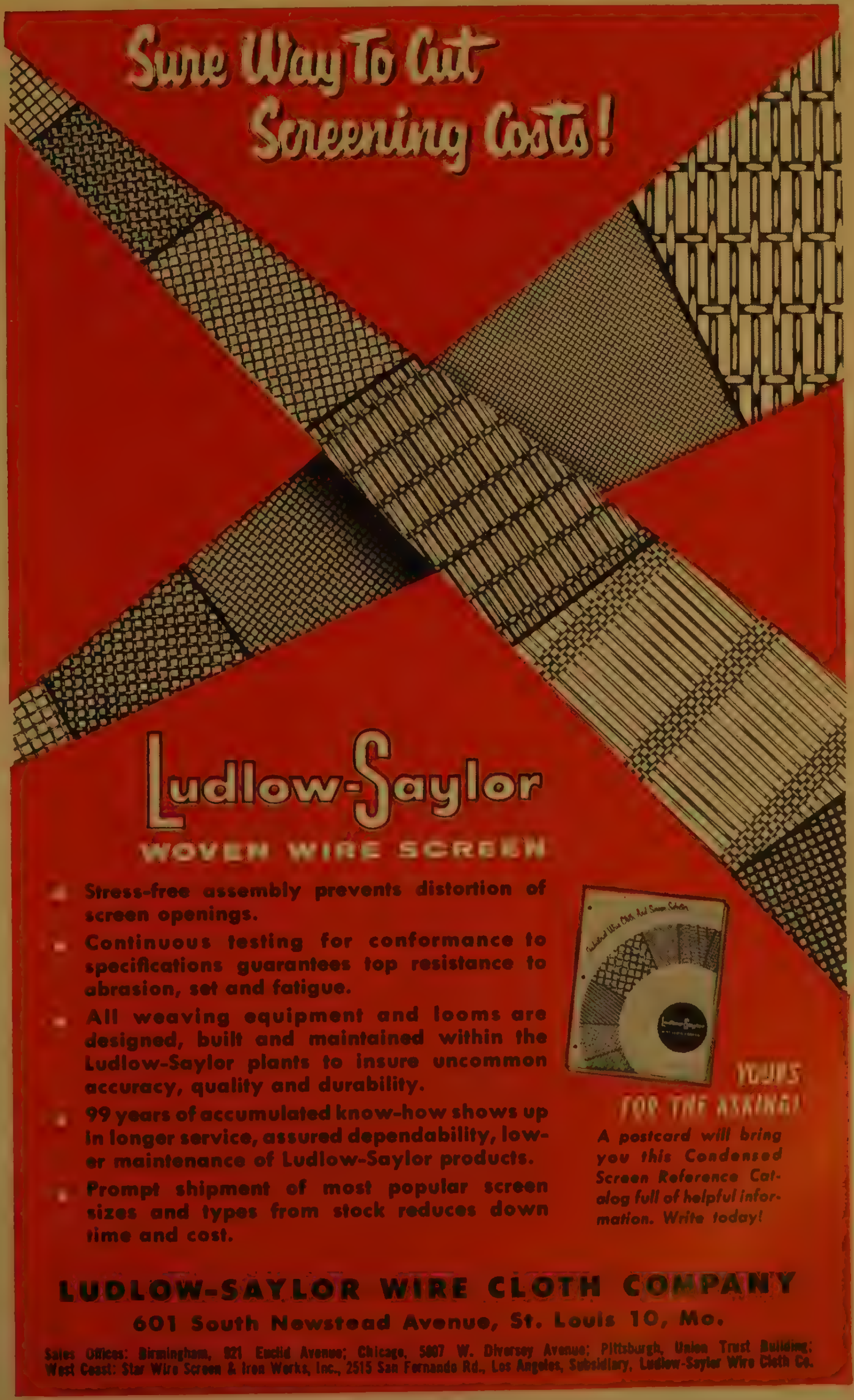
Calspray Appoints McVickar

Dr. Malcolm H. McVickar has been appointed chief agronomist for California Spray-Chemical Corp., Richmond, Cal., it was announced early last month by the firm. Dr. McVickar was formerly chief of the Agronomic Education Div., National Plant Food Institute. His Calspray appointment takes effect April 1.

As chief agronomist for Calspray, Dr. McVickar will make his headquarters at the company's home office in Richmond, where its parent company, Standard Oil Co. of California, is setting up a new $16,000,000 fertilizer operation. The six plants of the new fertilizer unit will produce a wide variety of pelletized, complex fertilizers. Completion is scheduled for early fall of this year.

Dr. McVickar, an agronomist since 1936, is the author of two books, *Using Commercial Fertilizer* and *Pasture Handbook*. The latter is now being published by the Interstate Publishing Co. He has also written numerous scientific articles and hundreds of popular articles in trade journals and farm magazines.

Dr. McVickar served for eight years as secretary of the National Joint Committee on Fertilizer Application.



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Ammonia Dealers Elect Davis

G. E. Davis, Lepanto, Ark., was elected president of the Arkansas Anhydrous Ammonia Dealers Association at its fourth annual convention Feb. 13 at Hotel Lafayette, Little Rock. Mr. Davis was secretary of the association in 1955.

Other new officers are George Dunklin, Pine Bluff, vice president, and W. O. Hazelbaker, Jr., Stuttgart, secretary-treasurer. Mr. Dunklin and William De Yampert are newly elected members of the board of directors. Other directors whose terms will continue through 1956 are W. O. Melton, M. O. Raspberry, Mr. Hazelbaker and Mr. Davis. Board members who are retiring this year are Hampton Pugh and Woodrow Castleberry.

Speakers at the one-day convention included: Dr. R. L. Beecher, agronomist for the University of Arkansas; Dr. Paul J. Talley, agronomist, Lion Oil Co. at El Dorado, and Dr. F. E. Boyd, agronomist for the Virginia-Carolina Chemical Co., Montgomery, Ala.

Purdue Pest Control Op. Meet

More than 350 pest control operators from 28 states and Canada attended the 20th annual Purdue Pest Control Operators Conference, January 30 - February 3rd, sponsored by Purdue University in cooperation with the National Pest Control Association. Highlighting the meeting was the presentation of an engraved citation and gifts to J. J. Davis, who has directed the conference for the past 20 years and who retires July 1, 1956.

Featured at the four-day meeting were reports on the problem of insect resistance by E. F. Knipling, USDA; alternate methods of control for resistant insects, by J. C. Keller, Orlando, Florida, Research Laboratory; and the mode of action of chemicals and mechanism of insecticidal action, by K. W. Kearns, University of Illinois.

K. M. Hassler and N. R. Emmann reviewed some of the recent advances on technique and knowledge in field application of methyl bromide; while G. E. Lehker, B. E. Montgomery, and J. J. Davis discussed the biology of insects, principles of insect control, and identification and control of insects.

General discussions on stored grain insects and emphasis on the clean grain program were featured in a "Pest of the Year" program. A demonstration on use of dusts and baits in pest control, by A. M. Akers and George E. Gould, completed the program the final day of the meeting.

New Chem. Co. in Brazil

A new company, Industrias Quimicas Reunidas Bek, S.A., San Paulo, Brazil, has been formed recently to expand the work of the old company, Productos Beko Ltda., to manufacture disinfectants and insecticides. Plans for a new factory are currently being negotiated.

NPFI-TVA to Exchange Info

The Tennessee Valley Authority announced last month that arrangements are being made for exchange of technical information between the TVA and the National Plant Food Institute.

TVA had a similar arrangement with the National Fertilizer Association before it consolidated with the American Plant Food Council to form the NPFI.

One important outcome of this cooperative program, TVA said, was TVA's development of the process for continuously ammoniating superphosphate.

APS Div. Meets June 5-6

The North Central Division, American Phytopathological Society, will hold its summer meeting June 5-6 at Kansas State College, Manhattan, Kan. The program will feature investigations on cereal diseases, stone fruit viruses, sweetpotato and forage crop diseases.

Armour Names Two Sales Reps.

Armour & Company's Chemical Division announced recently the appointment of Robert Avinger and Lester Garrison as regional reps.

Mr. Avinger will handle chemical sales in West Texas and New Mexico and Mr. Garrison will cover the Southeast section of the U.S.

CVPFA Meeting May 7-9

The third annual meeting of the Carolinas-Virginia Pesticide Formulators Association, Inc. will be held at the Ocean Forest Hotel, Myrtle Beach, S. C., May 7-9.

W. P. Crown, president of the Association announces that program details will be given at a later date. W. R. Peele, is secretary-treasurer.

Fulton Elects New Officers

Fulton Bag & Cotton Mills, New Orleans, announced last month that new officers were elected to head the firm. They are: Robert O. Arnold, president and chairman of the board; Norman E. Elsas, vice president and general manager mills division; Charles E. Elsas, vice president and general manager fabrics division; and Jason M. Elsas, vice president and general manager bag division. Also elected as vice presidents were Fred G. Barnet and E. Monroe Hornsby, while E. A. Cronheim was named secretary-treasurer.

Tolerances on Piperonyls

The Food and Drug Administration announced late last month the approval of tolerances for residues of piperonyl butoxide and pyrethrins on barley, buckwheat, corn, rice, rye and wheat. The tolerance for piperonyl butoxide is 20 ppm from post-harvest application; the tolerance on pyrethrins is 3 ppm for residues following post-harvest.

The FDA announced also that E. I. duPont de Nemours & Co., Wilmington, has withdrawn a petition for a residue tolerance for 3,(3-4-dichlorophenyl)-1, 1-dimethylurea on alfalfa and grass crops.

Union Bag Appointments

Union Bag & Paper Co., New York, announced last month that Sidney K. Bradley, vice president in charge of multiwall bag sales, will also supervise sale of standard products, flexible packaging, industrial and market papers.

Fred Meendsen, formerly vice-president in charge of advertising and promotion, has been named vice-president in charge of marketing services for the company.

Nitro Div. Offers Tax Buln.

"How to Save Money on Your Farm Income Tax" is the title of a new booklet prepared by the J. K. Lasser Tax Institute and offered free by the Nitrogen Division of Allied Chemical & Dye Corp., New York. Written in concise, everyday language, the booklet enables the farmer to grasp his tax deduction situation with a minimum of reading. Among subjects covered are: how to compute your farm income, forms to use, farmer's self employment income, declarations for farmers, and crop damage payments.

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Continental Personnel Changes

In a reorganization of personnel in the Metal Division of Continental Can Co., New York, necessitated by substantial sales increases and recent retirements, the following staff changes, effective March 1st, have been announced.

L. Ylvisaker has been advanced from director of staff for the Metal Division, in New York, to general manager of the Metal Division Research and Development Department, Chicago. E. L. Hazard, now general manager of the northeastern district of the Eastern division, will become director of staff.

W. K. Neuman has been appointed manager of new products. R. S. Hatfield is appointed general manager of sales. R. D. Heaviside, formerly district sales manager in Baltimore, has been appointed general manager of the northeastern district, New York; S. M. Bixler, previously plant manager at Harvey, Louisiana, becomes general manager of the mideastern district, Baltimore; J. S. Devlin, formerly Houston district sales manager, is now general manager of the southeastern district, New Orleans.

In the Pacific division, C. F. Marquard, previously manager of production engineering for the Central division, has been named general manager of the south Pacific district, San Francisco; J. W. Broomhead, heretofore plant manager at Pittsburgh, has become general manager of the north Pacific district, Portland Oregon.

•

Conn. Ag Station Kept Busy

The Connecticut Agricultural Experiment Station, New Haven, Conn., played host last month to many agricultural groups. The annual mid-winter meeting of vegetable growers was held at the station Feb. 1. New Haven County poultrymen met Feb. 9; a group from the American Iris Society met Feb. 11 and the New Haven County fruit growers held a meeting Feb. 15. Connecticut beekeepers met Feb. 18 and the Judges' Council of the Federated Garden Clubs of Connecticut held its monthly meeting Feb. 21.

•

CFA Elects Anderson to Board

John C. Anderson, Bakersfield, Cal., was recently elected to the Board of Directors of the California Fertilizer Association. Mr. Anderson is president of The Agriform Company, Inc.

Moretti, Director of DOCA

Louis Moretti, secretary-treasurer of United-Heckathorn, Richmond, Calif., and president of Industrial Minerals and Chemical Co., Berkeley, Calif., was among leading U. S. business and professional men who were at Fort Benning for the Army phase of the Defense Department's Civilian Orientation Conference. Following the conference, Mr. Moretti was elected to the board of Defense Orientation Conference Assn.

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Tolerance Applications for Pesticides, Filed Since Oct. 1, 1955

<table>
<tr><th>Chemical</th><th>Co. Requesting Tolerance</th><th>Fed. Reg. Date</th><th>Date Acknowledged</th></tr>
<tr><td>Aldrin</td><td>Shell Chemical Co.</td><td>11/3/55</td><td>10/28/55
(date of refiling. Original application filed 4/15/55).</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 0.1 part. <i>Commodities</i>: Apples, pears, & quinces; cherries; cranberries; grapes; peaches; nectarines, apricots, mangoes, pineapples, plums & prunes; strawberries; asparagus; celery, collards, kale, mustard greens, spinach, Swiss Chard; corn, grain (including sweet, field, & popcorn); eggplant, peppers, & pimentos, endive (escarole), lettuce, and salsify; melons (includ. cantaloups, muskmelons, watermelons), pumpkins, winter squash; peas and cowpeas (includ. forage); tomatoes, grains (includ. oats, rye, barley, wheat, rice, and sorghum); grain forage.
<i>Tolerance</i>: 0.25 p/m. <i>Commodities</i>: Citrus fruits, (includ. grape fruits, lemons, oranges and tangerines); beans (includ. black-eyed peas and soybeans); beets (garden variety), turnips and rutabagas (includ. tops); beets, sugar (includ. tops); broccoli, brussels sprouts, kohlrabi; cabbage and cauliflower, carrots, horseradish, parsnips, and radishes (incl. tops); cucumbers & summer squash; onions (incl. leeks, shallots and garlic); peanuts.
<i>Tolerance</i> : 0.75 p/m. <i>Commodities</i>: Corn, fodder, or forage; legumes for forage (incl. clovers, alfalfa, soybean hay, peanut hay, lespedeza); grass crops (pasture & range grass, timothy, grass hay).</td></tr>
<tr><td>Chlortetracycline</td><td>American Cyanamid Co.</td><td>11/3/55</td><td>10/28/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 23 parts. <i>Commodities</i>: Dressed poultry (not cooked).</td></tr>
<tr><td>Dichlorophenyl, Dimethylurea</td><td>E. I. du Pont Nemours & Co., Inc.</td><td>10/22/55</td><td>10/17/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 2 parts. <i>Commodities</i>: Alfalfa and grass crops (grass hay).</td></tr>
<tr><td>Dieldrin</td><td>Shell Chemical Co.</td><td>11/3/55</td><td>10/28/55
(Refiling)
(Original filing 4/15/55)</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 0.1 part. <i>Commodities</i>: Cranberries, grapes, pineapples, plums, & prunes; strawberries; corn, grain (incl. sweet, field, & popcorn); corn, fodder or forage; cucumbers and summer squash; eggplant, peppers, & pimentos; lettuce, endive (escarole), & salsify; peas & cowpeas (incl. forage); potatoes & sweet potatoes; tomatoes; grains (incl. oats, rye, barley, wheat, rice & sorghums); grain forage; legumes for forage (incl. clovers, alfalfa, soybean hay, peanut hay, lespedeza).
<i>Tolerance</i>: 0.25 part. <i>Commodities</i>: Citrus fruits; mangoes, asparagus; beans (incl. black-eyed peas & soybeans); beets (garden variety), turnips & rutabagas (incl. tops); broccoli, brussels sprouts, kohlrabi, cabbage & cauliflower; carrots, horseradish, parsnips & radishes (incl. tops); celery; collards, kale, mustard greens, spinach, & Swiss chard; melons (incl. cantaloups, muskmelons, watermelons), pumpkins, winter squash.
<i>Tolerance</i>: Amended from 0.1 part to 0.25 parts. <i>Commodities</i>: Apples, pears, quinces, cherries, peaches, nectarines & apricots.</td></tr>
<tr><td>Endrin</td><td>Shell Chemical Co.</td><td>11/4/55</td><td>10/31/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 0.1 part. <i>Commodities</i>: Cabbage, cottonseed, cucumbers, eggplant, peppers, potatoes (Irish), sugar beets (incl. tops), summer squash, sweet corn (grain); and tomatoes.</td></tr>
<tr><td>Ethylene Dibromide</td><td>Dow Chemical Co.</td><td>9/29/55</td><td>9/22/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 10 parts. <i>Commodities</i>: Asparagus, cauliflower.
<i>Tolerance</i>: 100 parts. <i>Commodities</i>: Carrots, carrot tops, celery, sugar beet tops.
<i>Tolerance</i>: 50 parts. <i>Commodities</i>: Corn, sweetpotatoes.
<i>Tolerance</i>: 200 parts. <i>Commodities</i>: Cottonseed.
<i>Tolerance</i>: 20 parts. <i>Commodities</i>: Lettuce.
<i>Tolerance</i>: 5 parts. <i>Commodities</i>: Lima beans, strawberries, sugar beets.
<i>Tolerance</i>: 75 parts. <i>Commodities</i>: Potatoes (Irish), parsnips, turnips, & rutabagas.</td></tr>
<tr><td>Hydrogen Cyanide</td><td>American Cyanamid Co.</td><td>10/18/55</td><td>10/12/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 25 parts. <i>Commodities</i>: Cocoa beans, peanuts, dried beans, (incl. Navy beans, lima beans and kidney beans), dried peas (incl. cowpeas, chick peas, & blackeyed peas), almonds, cashews, pecans, walnuts, & grains: barley, corn, popcorn, rice (rough & polished), rye & wheat.</td></tr>
<tr><td>Lindane</td><td>Benzene Hexachloride Committee, NACA, Falls Church, Virginia</td><td>12/15/55</td><td>12/9/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 10 parts. <i>Commodities</i>: Mushrooms.</td></tr>
<tr><td>Ovotran (ovex)</td><td>Dow Chemical Co.</td><td>12/10/55</td><td>12/5/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 2 parts. <i>Commodities</i>: Apples, peaches and pears.
<i>Tolerance</i>: 3 parts. <i>Commodities</i>: Citrus & plums (fresh prunes).</td></tr>
<tr><td>Perthane (also known as diethyl diphenyl dichloroethane)</td><td>Rohm & Haas Co.</td><td>12/14/55</td><td>12/9/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 25 parts. <i>Commodities</i>: Broccoli, brussels sprouts, endive, kale, kohlrabi, lettuce, mustard greens, parsley & spinach.
<i>Tolerance</i>: 15 parts. <i>Commodities</i>: Cherries (sweet & sour).
<i>Tolerance</i>: 0.2 parts. <i>Commodities</i>: Milk, or residues in milk from use of diethyl diphenyl dichloroethane on dairy animals be exempt from the requirement of a tolerance.</td></tr>
<tr><td>Pyrethrins</td><td>Food Machinery & Chemical Corp</td><td>9/29/55</td><td>9/23/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 2.7 parts. <i>Commodities</i>: Corn, wheat, buckwheat, oats, barley, rye, flaxseed, rice, popcorn, peanuts, beans and peas.</td></tr>
<tr><td>Sodium -O-phenylphenate</td><td>Dow Chemical Co.</td><td>12/20/55</td><td>12/13/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 10 parts. <i>Commodities</i>: Citrus fruits.</td></tr>
<tr><td>Systox</td><td>Chemagro Corp.</td><td>9/29/55</td><td>9/22/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 0.75 parts. <i>Commodities</i>: Extend tolerance to include beans.</td></tr>
<tr><td>Thiram</td><td>E. I. du Pont de Nemours & Company</td><td>12/23/55</td><td>12/16/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 3 parts. <i>Commodities</i>: Apples.</td></tr>
<tr><td>Toxaphene</td><td>Hercules Powder Co.</td><td>11/29/55</td><td>11/23/55</td></tr>
<tr><td colspan="4"><i>Tolerance</i>: 7 parts. <i>Commodities</i>: Cranberries, plums, prunes, beets, turnips, rutabagas, sugar beets, horseradish, parsnips, collards, kale, mustard greens, spinach, Swiss chard, peppers, pimentoes, cowpeas, oats, rye, barley, wheat, rice, sorghum, grain, buckwheat, pecans, walnuts, hazelnuts, hickory nuts, almonds, meat.
<i>Tolerance</i>: 60 parts. <i>Commodities</i>: Clovers, alfalfa, soybean hay, peanut hay, lespedeza, cowpea hay, pasture & range grass, timothy, grass hay, corn forage, sorghum, forage, sugarcane.</td></tr>
</table>

Dr. G. C. Klingman, North Carolina State College, Raleigh, president, Southern Weed Conference for 1955; Dr. W. B. Albert, South Carolina Agri. Experiment Station, Clemson, newly elected president for 1956; Dr. E. G. Rodgers, University of Florida, Gainesville, vice-president; and Dr. W. K. Porter, Louisiana Agric. Exp. Station, Baton Rouge, secretary-treasurer.

Southern Weed Conference

The ninth annual Southern Weed Conference, attended by over 300 agricultural scientists from 13 southern states, concluded a three-day conference devoted to chemical warfare on weeds and their damaging effects on agriculture, public health and general national welfare. The meeting was held at the Jung Hotel, New Orleans, Jan. 15-18.

Dr. Glenn C. Klingman, North Carolina State College, who presided over this year's session of the conference, reported that substantial gains have been made in the weed crusade during the past year, and that technical developments as well as increased know-how in the use of chemical herbicides and new and improved chemical weed killers being developed promise greatly improved crop production throughout the South. Research in the war on weeds is progressing faster than in any other field, according to Dr. Klingman. He reports that the greatest need for continued improvement is more skilled technical personnel.

At the closing session, Dr. W. B. Albert, plant physiologist at South Carolina Agricultural Experiment Station, Clemson, was named president for 1956. Dr. Earl G. Rodgers, agronomist, University of Florida, Gainesville, was elected vice president. Dr. Walter K. Porter, plant physiologist, Louisiana Agricultural Experiment Station, Baton Rouge, was elected secretary-treasurer.

Next year's conference will be held at the Bon Air Hotel, Augusta, Georgia, January 23-25. It was also announced that the Southern Weed Conference will be host to the Weed Society of America at its biennial meeting in Memphis, Tenn., January, 1958.

CSC Views Product Important

At a meeting of 150 representatives of Midwest industries, in Chicago recently, Commercial Solvents Corp. said it believes that nitroparaffins are shaping up as an important growth item for the company. The nitroparaffins, developed jointly by CSC and Purdue University, have wide applications in industry, including chemical manufacturing and agriculture.

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California Spray-Chemical Corporation's new liquid fertilizer plant, adjoining its dust mill and warehouse in Modesto, Cal., is now in production. It is the first plant to be completed in the $16,000,000 fertilizer plant program now underway in California by the Standard Oil Co. of California and its subsidiary, Calspray.

Maxey Joins Frontier Chem.

Frank P. Maxey has joined Frontier Chemical Co., Wichita, Kansas, as a sales representative. He will operate out of Dallas, after indoctrination at the company's principal offices in Wichita.

Mr. Maxey was associated for several years as a product manager with Sharples Chemical Division, Philadelphia, and also worked with Munising Paper Co., Munising, Mich.

Fertilizer Plant For Calspray

California Spray-Chemical Corp., Richmond, Cal., recently opened a new liquid fertilizer plant, reported to be capable of producing 400 tons of aqua ammonia and 100 tons of neutral mix fertilizer a day, to serve San Joaquin Valley growers in Modesto, Cal. Arthur W. Mohr, Calspray president, officiated at the opening ceremonies.

Robert Hack will head the Modesto plant operation and Leslie R. Hamilton has supervised the training of a group of fertilizer specialists who have been added to Calspray's regular field service staff. W. E. Jaqua has been appointed supervisor of fertilizer sales in the Western region.

•

Jordan Enters Consultant Field

W. Alec Jordan, formerly editor-in-chief of *Chemical Week*, has entered practice as a chemical business consultant with offices in New York. He will specialize in market development, product promotion and related chemical business problems. Mr. Jordan has had extensive experience in techical service and chemical sales management.

•

New Diamond Sales Rep.

Diamond Black Leaf Co., Cleveland, announced last month the appointment of two sales and service representatives to the nation-wide staff. They are James H. Hoskins, for the San Francisco area, and Oliver R. Eames, Detroit area. Both men will assist garden supply dealers, hardware retailers, druggists, nurserymen, and feed and seed merchants.

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DUVAL

Muriate of Potash?

- HIGH ANALYSIS
- IMPROVED PHYSICAL CONDITION

DUVAL SULPHUR and POTASH CO.

Modern Plant and Refinery at Carlsbad, New Mexico

Please address communications to
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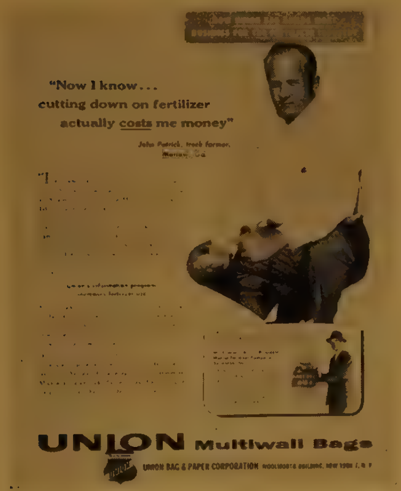
District Offices
NORFOLK, VA. • CHARLESTON, S.C. • TAMPA, FLA.
JACKSON, MISS. • COLUMBUS, OHIO

Cal. Fertilizer Plans Expansion

A branch factory and central distribution warehouse in Torreon, Mexico, is planned by California Liquid Fertilizer Co. Torreon is one of the major agricultural areas in Mexico. The reported investment is said to run into millions of pesos and will help fill an important demand for fertilizer.

•



"Now I know... cutting down on fertilizer actually costs me money"

UNION Multiwall Bags

Union Bag Education Program

The first in a new series of advertisements by Union Bag & Paper Corp., New York, is illustrated above. The series is part of a testimonial advertising campaign, featuring both fertilizer manufacturers and farmers, including comments from representatives of both groups on the effectiveness of Union's educational program in behalf of the fertilizer industry.

•

Weevils Pose Problem in Tenn.

The Tennessee Department of Agriculture finished its fall hibernation studies on the boll weevil last month. The survey indicated that an average of more than 900 weevils per acre went into hibernation last fall, and that weevils are well scattered over at least the eight southern border counties of West Tennessee.

•

Changes in Shell Sales Div.

Shell Chemical Corp., New York, announced last month two personnel changes in its agricultural chemical sales division. C. H. Daniels was appointed to the Atlanta district as a sales development field representative. O. W. Whitehead, has joined Shell's Atlanta district as a sales representative.

Mr. Daniels has been with Shell since 1947. He was employed in the marketing phase of the company's agricultural chemicals. Mr. Whitehead was formerly with the U. S. Department of Agriculture as district supervisor of plant pest control, Statesboro, Ga.

•

Cal. Fertilizer Conf. April 16

The fourth annual California Fertilizer Conference will be held on the campus of the Citrus Experiment Station, University of California, Riverside, April 16-17. The conference is sponsored by the Soil Improvement Committee, California Fertilizer Association.

John H. Nelson, Stockton, Cal., chairman of the arrangements committee, said the conference will be of educational interest to the fertilizer manufacturers; salesmen and dealers; farm organizations and members; research and instruction personnel of the University of California, colleges and high schools; staffs of the State and USDA.

TYPE 41 CLAY

In making organic concentrates using benzene hexachloride, chlordane, toxaphene, and other similar materials, it is important to have the concentrates free flowing.

TYPE 41 Clay can be combined with more costly diluents, such as Fuller's earth, and the result will be a free-flowing concentrate, at a lower cost to the producer.

TYPE 41 Clay has the following advantages:

NON ABRASIVENESS
FINE PARTICLE SIZE
ABSORBTIVENESS
PROPER BULK
HIGH INSECTICIDAL VALUE OF CLAY ITSELF
LOW PH VALUES
NO PHYTOTOXICITY TO PLANTS
OUTSTANDING ABILITY TO STICK TO THE LEAF

For Further Information or Samples Write to

SOUTHEASTERN CLAY COMPANY
Aiken, South Carolina

Am. Ag. Personnel Changes

The American Agricultural Chemical Co. announces the following personnel changes:

R. M. Richey formerly superintendent of Baltimore Works becomes responsible for production as divisional superintendent at the following A.A.C. Co. plants: Alexandria, Va., Baltimore, Md., Cincinnati, O., Henderson, N. C., Norfolk, Va., Washington Court House, O.

J. A. Layton, formerly of production department, New York office, becomes responsible for production at Baltimore Works as superintendent.

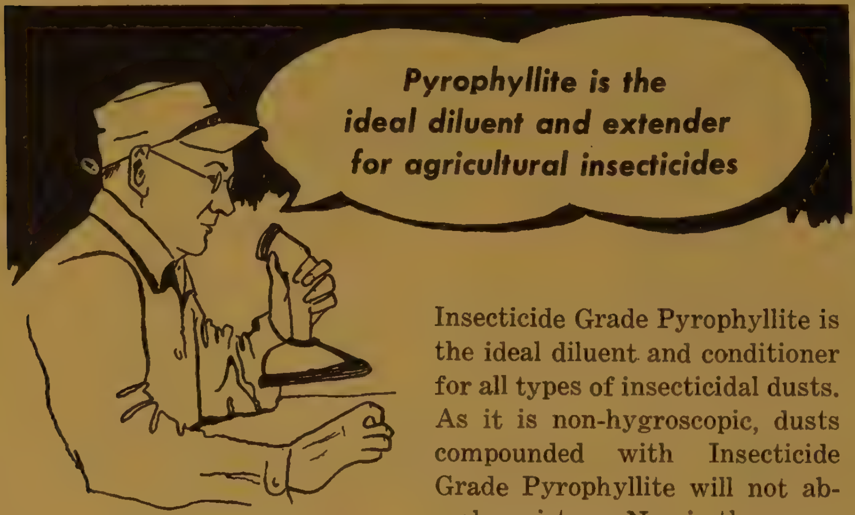
R. M. Ludwig, becomes responsible for all phases of the company's chemical control work as director, chemical control department.

B. E. Thorne, formerly assistant manager, Buffalo sales office, becomes responsible as assistant manager, New England sales office at North Weymouth, Mass.

J. J. Graham, formerly manager of Houlton Sales, becomes responsible as manager of New England sales, office at North Weymouth, Mass.

R. R. Johnson, formerly sales supervisor of Humboldt sales office, becomes responsible as assistant manager, Humboldt Branch at Humboldt, Iowa.

E. B. Stalnaker, Jr., formerly assistant manager, Alexandria, Va. sales office, becomes responsible as assistant manager, Buffalo sales office.


Pyrophyllite is the ideal diluent and extender for agricultural insecticides

Insecticide Grade Pyrophyllite is the ideal diluent and conditioner for all types of insecticidal dusts. As it is non-hygroscopic, dusts compounded with Insecticide Grade Pyrophyllite will not absorb moisture. Nor is there any tendency even during extended storage, for the carrier to separate from the active ingredients.

Glendon's Insecticide Grade Pyrophyllite

Wt per cubic foot—30 lbs

92 to 95% will pass a 325 mesh screen

pH range of 6 to 7

Non-alkaline and chemically inert

Average particle size below 5 microns

Insecticide Grade Pyrophyllite has superior adhering properties, and because it is difficult to wet, it holds well on the plant leaves even during rain. When used as a carrier for products to be dusted by airplane, it settles rapidly, minimizing drift, waste of materials, etc.

Send for Testing Samples

GLENDON

Pyrophyllite Company
P. O. Box 2414
Greensboro, N. C.
Plant & Mines, Glendon, N. C.

1955 Insecticide Sales in La.

Approximately 29 million pounds of dust and 359,000 gallons of spray concentrates were sold in Louisiana during 1955, for the control of cotton and sugar cane insects. Of 40 companies registering labels and formulations and selling insecticides in the state, only a few failed to supply information summarized as follows:

Cryolite and Ryania were used for control of the sugar cane borer and nearly all the other insecticides for control of cotton insects. Enough cotton dust was sold in the state to have made 4.5 to 5 applications on all the cotton grown. There was approximately 1,000,000 pounds more calcium arsenate sold in 1955 than in 1954 for boll weevil control. About 150,000 pounds more Cryolite were sold and 1 3/4 million pounds less Ryania sold in 1955 than in 1954, most of this being for sugar cane borer control. There was also a considerable quantity of 5 percent BHC sold in 1955, primarily in an effort to improve control of cotton aphids and the cotton boll weevil.

It is estimated that there was about 5 percent more insecticides sold in the state during the year than included in this report; based on the fact that some of the companies did not report.

•

Conn. Fruit Growers Meet

The annual mid-winter meeting of fruit growers at the Connecticut Agricultural Experiment Station featured discussions on pest control and marketing. Wilbur H. Marshman presided.

William D. Tunis, reviewed the question of "What sprays to use in 1956." Dr. Philip Garman, reported on some of the latest findings on experiments in insect control and Baldwin spot. Neely Turner, vice director of the Station, pointed out that flexibility in use of the Station's manpower resources makes it possible to attack both basic and immediate problems effectively. Mr. Turner and a panel of growers completed reports at the meeting with an analysis of the pesticide residue situation from the grower's point of view.

NEWS
Brevities

W. S. Smith, Bossier City, La., has been named manager of the Louisiana Liquid Fertilizer Co., Inc.

AC

J. H. Pate, assistant manager, Norfolk, Va., division, Armour Fertilizer Works, was recently named manager of the firm's Wilmington, N. C., division. Mr. Pate succeeds F. L. Wooten, Jr., who has been transferred to the general office in Atlanta as unit sales manager.

AC

Shea Chemical Corp., Jeffersonville, Ind., announced last month immediate availability of liquid phosphate supplement for the feed industry.

AC

R. P. Cagley, former assistant sales manager of American Agricultural Chemical Co., Cleveland branch, was recently named assistant sales manager of the company's East St. Louis, Ill., branch.

AC

R. Kirby Shirley, 56, senior vice president, Freeport Sulphur Co., New York, died January 24th in New York Hospital. He had directed development of four new sulfur mines on the Gulf Coast since 1950.

AC

Climax Molybdenum Co., New York, has retained Dr. John G. Dean, chemical and metallurgical consultant, to advise on certain aspects of the company's recently expanded chemical program.

AC

Martin J. Tierney has been appointed commercial development manager of the Naugatuck Chemical division, U.S. Rubber Co., New York.

AC

A New Sulfur Plant, with a yearly capacity of 20,000 tons, has begun operations at Hinojeda, Spain. Last year sulfur imports totaled 8,330 tons.

AC

Rodger C. Smith, a member of the fertilizer research staff, has been appointed head of fertilizer research for Eastern States Farmers' Exchange, West Springfield, Mass. He has been with Eastern since 1938.

AC

Dr. Raymond Wynkoop, International Minerals & Chemical Corp., was recently appointed manager of the general engineering department.

AC

E. I. du Pont de Nemours & Co., Wilmington, Del., recently announced the appointment of James F. McDonough to its Detroit area sales staff.

AC

Harold J. Miller, Pennsylvania Salt Manufacturing Co., Philadelphia, has joined the technical development department of the firm's Washington subsidiary.

AC

Monsanto Chemical Co., St. Louis, announced Jan. 24 it is marketing a new liquid phosphate animal feed supplement to be known as "phosphate feed solution." The material is being marketed as a replacement for phosphates which are used currently by the feed industry in dry form.

AC

Donald L. Fuller has been appointed director of research for Grace Chemical Research and Development Co., Div. of W. R. Grace & Co., New York. Mr. Fuller came to Grace from American Cyanamid Co. He was previously a research chemist for Shell Development Co.

Two New Fertilizer Factories are planned for Cork and Sligo, Ireland, according to an announcement by Messrs. W. & H. M. Goulding.

AC

The Commonwealth Government, Australia, has decided to withdraw from the management and financing of both the importation of ammonium sulfate and its distribution.

AC

Velsicol Chemical Corp., Chicago, Ill., recently announced the appointment of Edward B. Lukas to the position of technical service representative. His headquarters will be at the Chicago general offices and laboratories.

AC

Richard M. Sibley has joined Dorr-Oliver, Inc., Stamford, Conn., as a sales engineer of the firm's eastern filtration division. Mr. Sibley was previously employed by American Cyanamid Co.

AC

Agricultural Chemicals displayed at the British Industries Fair, April 23 - May 4 in London, will include a phosphorus insecticide display.

AC

Sibai, Jamaleddine & Co., Homs, Syria, report they are in the market to purchase direct 100 metric tons each of potassium chloride fertilizer, sodium nitrate fertilizer, superphosphate fertilizer, and ammonium sulfate fertilizer.

AC

J. T. Simpson, chairman of the Uganda Development Corp. Ltd., Africa, reported recently that senior officials of Frobisher Ltd., Canada, are interested in prospects for developing the large phosphate deposits at Sukulu, in Eastern Uganda.

AC

Charles R. Bronaugh, Arkell & Smiths, Kansas City, was appointed sales representative in Kansas and Nebraska early last month.

AC

American Institute Of Chemists awarded a life-membership to Dr. Roy C. Newton, vice president of research, Swift & Co., Chicago, Feb. 17, in recognition of outstanding service.

AGRICULTURAL CHEMICALS, LTD., plan a modern fertilizer factory at Hyde Park (London) Ontario, to be in operation by July 1956.

AC

Wisconsin Alumni Research Foundation moved its Chicago Office to 20 North Wacker Drive, Chicago early in January. New phone number is FInancial 6-3050.

AC

HERCULES POWDER CO., Wilmington, announced last month that Edmund P. Rochford was to retire on Feb. 29 as works manager of the Port Ewen, N. Y., plant. He will be succeeded as works manager by Edward K. Lefren, and H. I. Etchells, Jr., will assume the duties of assistant works manager.

AC

SAMUEL L. NEVINS, vice president of Olin Mathieson Chemical Corp., was awarded last month an honorary Doctor of Laws degree from the University of Arkansas, in recognition of his achievements in chemical research and as an industrialist.

AC

RICHARD F. BROWN, vice president and general works manager of Spencer Chemical Co., Kansas City, resigned recently to accept a position with a nitrogen company.

AC

AMERICAN POTASH & CHEMICAL Corp.'s directors last month declared quarterly dividends of 62.5 cents per share on Class A and B stock and $1.00 a share on the $4.00 cumulative preferred stock, series A.

AC

MICHIGAN CHEMICAL CORP., St. Louis, Mich., announced recently the appointment of Arthur K. Doig to its organic research staff. Mr. Doig was associated with Shulton, Inc., for the past six years, carrying on organic synthesis research.

AC

W. W. SCHNEIDER, vice president, treasurer, general counsel and member of the board and finance committee of Monsanto Chemical Co., was elected recently to the executive committee succeeding executive vice president R. R. Cole, who has retired.

AC

STAUFFER CHEMICAL CO. and Wilson & George Meyer & Co. have signed a long-term exclusive sales agreement whereby the Meyer firm will widen its distribution in the West and Midwest to handle Stauffer's new pelletized agricultural phosphates.

AC

LINZ NITRO-FERTILIZER WORKS, Austria, completed recently a contract with Red China to sell them chemical products valued at 2.5 million pounds sterling.

AC

VIRGINIA-CAROLINA CHEMICAL CORP. has opened a new distributing warehouse in Danville, Ky. Joseph Milburn has been named manager of the branch.

AC

R. KIRBY SHIRLEY and Pearson E. Neaman have been elected senior vice presidents of Freeport Sulphur Co., New York, by the board of directors.

DE-PESTER
THE DEPENDABLE BRAND

INSECTICIDES
Liquid and Dust Concentrates
Finished Dusts and Sprays
for the
Domestic and Export
Market

BHC
DDT
Toxaphene
Aldrin
Dieldrin
Endrin
Malathion
Parathion
Methyl Parathion
Chlordane
Sulphur

Liquid and Dry Fertilizers
Defoliants
Other Agricultural Chemicals

Experienced
Entomologists, Chemists & Plant Personnel

7 Modern Raymond Mills
14 Dust Blenders
6 Liquid Plants
in
Eleven Strategic Locations

Available for Custom Grinding, Blending, and Processing

Agricultural Chemicals, Inc.

Plants Located: Batesville, College Station, Dallas, Henderson, Llano, Lubbock & Pecos, Texas; Natchitoches, Louisiana; Greenville, Mississippi; Lima, Peru; San Salvador, El Salvador, C. A.

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Phone 495

the ENOUGH that makes the difference

THE SLIP THAT HUDSON INKED OUT!

Slippery bags may be merely a source of mild irritation . . . but they can also be the cause of serious injury to both man and business.

Literally, Hudson *inks out* this hazard. Non-Slip inks, now standard on Hudson Multiwalls, put the brakes on slippage. When stacked, they cling to each other like honeymooners in the dark. Shipped in bumping trucks or humping boxcars, Hudson sees your product through *securely*.

If you'd like to know more of the Hudson story as it relates to your business . . . such as *certified supply* through complete integration from Hudson-owned forests to Hudson-made kraft . . . or *sure-time delivery* through controlled scheduling from four strategically located plants . . . use the coupon and we'll be glad to visit at your convenience.

DESIGNED to DELIVER the PRODUCTS of PROGRESS

Plants at
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PALATKA, FLA.
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HUDSON PULP & PAPER CORP.
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Yes! We'd like a copy of the 46-page illustrated book on "What to Look for in a Dependable Source of Supply," and details on the Hudson guarantee.

NAME__________ TITLE__________
COMPANY__________
ADDRESS__________
CITY__________ ZONE_____ STATE_____

J. A. Schmidlein, a chemical engineer with the American Cyanamid Co. for 15 years, has been named assistant plant manager of the Niagara Plant of North American Cyanamid Ltd., Niagara Falls, Ont., Canada.

AC

Atkins, Kroll & Co., San Francisco, Los Angeles and New York announces that Robert T. Brownscombe is now associated with the company, in fertilizer sales.

The Japanese Agriculture Ministry and the sales association of the German Potash Producers, Hanover, Germany, have concluded a sales contract for 70,000 tons of pure potash valued at $6.7 million.

AC

Olin Mathieson Chemical Corp's proposed purchase of 40 per cent of the common stock of F. H. McGraw & Co., heavy construction engineers, was approved Feb. 7 at a meeting of McGraw stockholders.

Spencer Chemical Co., Kansas City, played host last month to 23 "efficiency experts" in the art of growing corn. The group, represented the top participants in Spencer's 1955 efficient corn growing program.

AC

The Polish Embassy, Washington, D. C., announced recently that for the first time since the close of the war, Poland will this year discontinue importing nitrogen fertilizers, since its own industry is expected to meet domestic requirements.

AC

Financing Arrangements for the proposed $8 million ammonia plant of Quebec Ammonia Co. is now in the final stages. The new plant is being built at Varrennes, near Montreal.

AC

Chipman Chemicals Ltd., Montreal, announced recently it is establishing headquarters in Hamilton. The new location is considered the geographic center of the largest pesticides consuming market in Canada.

AC

Monsanto Chemical Co., St. Louis, announced Feb. 9 that G. Robert Sido, Cincinnati, has been named Washington technical representative. He succeeds K. Warren Easley, who will return to St. Louis.

AC

James F. Roe, International Minerals & Chemical Corp., has been named manager of the Florida operations of the Phosphate Chemicals Division. Charles A. White was also appointed recently as manager of the division's Tennessee operations.

AC

Swift & Co., will begin construction in the near future on a new plant food factory at Pompano Beach, Fla. It is hoped to have the new plant in operation this fall.

AC

Dow Chemical Co. moved its Philadelphia offices to Camden, New Jersey. The new address is 400 Market Street, Camden, 2, N.J.

AC

Kenneth D. Buchheit has been appointed sales-service representative in north Texas for the Pennsylvania Salt Manufacturing Co.'s B-K department.

Now, a BETTER carrier and diluent

Pike's Peak®

ABSORBENT CLAY

Try Pike's Peak Clay-extreme flexibility to handle the whole range of pesticide chemicals

- ★ **High degree of absorbency**—for grinding and impregnating all toxicants such as DDT, BHC, Toxaphene, Aldrin, Malathion, Parathion, Chlordane and many others.
- ★ **Extremely fine particle size**—has a high degree of flow ability before and after impregnation.
- ★ **Uniformly low moisture and pH of approximately 5** — assure you of complete compatibility with a wide range of toxicants.
- ★ **Standard grind guaranteed 95% through 325 mesh.** — Also available in a variety of particle sizes to meet your specifications.

Try Pike's Peak Clay in your operation. *You save . . .* not only in ton prices, but in production speed-ups. A generous free sample will be sent upon request for your evaluation.

General Reduction Company

1820 ROSCOE STREET
CHICAGO 13, ILLINOIS

NOW you can formulate high concentrate wettable powders at low cost with

MICRO-CEL

SUBSTANTIAL FORMULATION SAVINGS

Micro-Cel*, a new line of synthetic calcium silicates, has extremely high absorptive properties. It is this remarkable capacity for absorption that makes it possible to prepare wettable powders with higher concentrations of dry, viscous or liquid poisons. Micro-Cel's absorption also means that more lower cost diluents can be used. Thus high strength formulation costs are now cut to a new low.

REMAINS FREE-FLOWING—MEETS STORAGE TESTS

With Micro-Cel, these high concentrates will remain in a free-flowing state even after prolonged storage. This is particularly important in producing poisons for the export market.

In addition, suspension values after storage of 1.5 to 2.0 I.C.A. have been achieved in 75% DDT wettable powders, based on Micro-Cel. This is more than adequate for storage conditions encountered in most tropical countries.

DEVELOPED BY JOHNS-MANVILLE RESEARCH

Micro-Cel is another development of Johns-Manville Research. Combining high absorption, large surface area, small particle size and excellent dry flowability, it offers a unique combination of properties for insecticide formulation and other process needs.

Sample quantities and carload shipments are now available. Write for further data and sample formulations for poisons of interest to you. Or ask a Celite engineer to help you adapt Micro-Cel to your particular requirements and specifications.

*Micro-Cel® is Johns-Manville's new absorbent-grinding aid designed specifically for the insecticide formulator.

Johns-Manville

MICRO-CEL

SYNTHETIC CALCIUM SILICATES

A PRODUCT OF THE CELITE DIVISION

Johns-Manville, Box 60, New York 16, N.Y.
In Canada: Port Credit, Ontario

Please send ☐ further information; ☐ samples of Micro-Cel. I am interested in using Micro-Cel with the following poisons:

____

☐ Please have your local representative contact me.

Name ______________ Position ______________

Company ______________________________

Address ______________________________

City ______________ Zone ______ State ______________

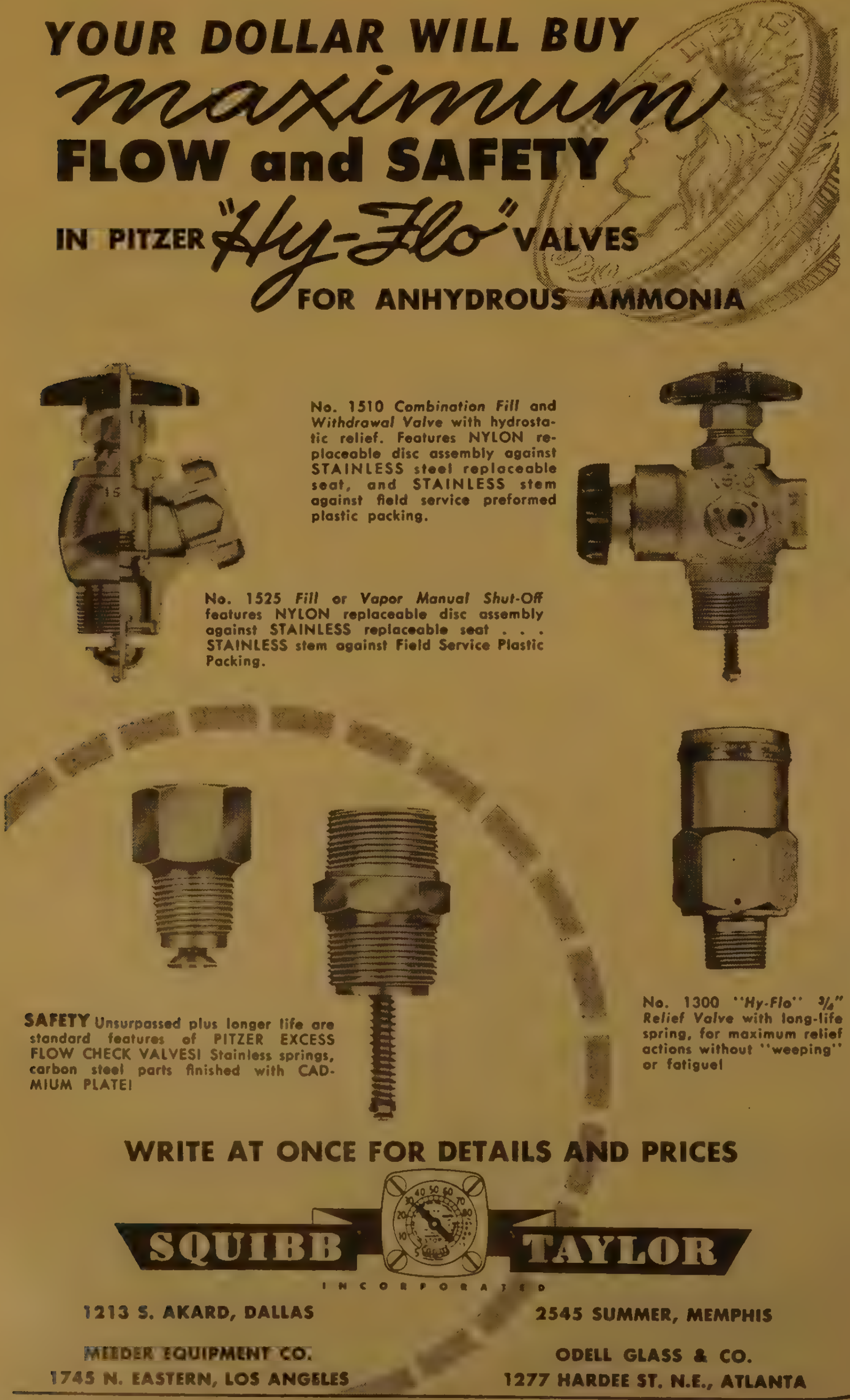
N. J. COLLEGE OF AGRICULTURE and Agricultural Experiment Station, Rutgers University, College Farm, N. J., has appointed Dr. David J. Burns as associate research specialist in agricultural economics and Ronald O. Aines, assistant professor of agricultural economics.

AC

WILLARD E. HAHN, vice president of St. Regis Paper Co., New York, was named recently as manager of manufacturing for all St. Regis packaging and converting plants as well as for the engineering and machine department.

AC

PAUL E. NELSON was recently named sales manager of the Chase Bag Co., New Orleans branch. He succeeds J. A. Sutherlin, who has been promoted to manager of export sales with headquarters in New Orleans.



YOUR DOLLAR WILL BUY *maximum* FLOW and SAFETY IN PITZER *"Hy-Flo"* VALVES FOR ANHYDROUS AMMONIA

No. 1510 Combination Fill and Withdrawal Valve with hydrostatic relief. Features NYLON replaceable disc assembly against STAINLESS steel replaceable seat, and STAINLESS stem against field service preformed plastic packing.

No. 1525 Fill or Vapor Manual Shut-Off features NYLON replaceable disc assembly against STAINLESS replaceable seat . . . STAINLESS stem against Field Service Plastic Packing.

SAFETY Unsurpassed plus longer life are standard features of PITZER EXCESS FLOW CHECK VALVES! Stainless springs, carbon steel parts finished with CADMIUM PLATE!

No. 1300 "Hy-Flo" ¾" Relief Valve with long-life spring, for maximum relief actions without "weeping" or fatigue!

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MEEDER EQUIPMENT CO.
1745 N. EASTERN, LOS ANGELES

ODELL GLASS & CO.
1277 HARDEE ST. N.E., ATLANTA

MICHIGAN CHEMICAL CORP. announces the appointment of Dr. Edward E. Ivy as technical service entomologist in the company's agricultural sales division. He will concentrate on methyl bromide and DDT programs in the southwest, working out of College Station, Texas.

AC

VICTOR CHEMICAL WORKS, Chicago, has appointed John Paul Jones as assistant to the president. Mr. Jones was formerly vice president and general manager of Western Phosphates, Inc., Salt Lake City, Utah.

AC

NACO FERTILIZER CO., San Francisco, announced last month that it has been sold and is no longer in business in the state of California.

AC

LION OIL CO., announced last month the appointment of James W. Dowden as district geologist of the Denver district.

AC

WILSON & GEO. MEYER & CO., western distributors of agricultural and industrial chemicals have named N. A. Carlson as head of a new Spokane, Washington, office.

AC

H. J. PLOCH, research chemist for Lion Oil Co., division of Monsanto Chemical Co., has been transferred to technical sales service to work on the recently launched line of Monsanto farm chemical formulations.

AC

ARABIAN AMERICAN FERTILIZER CORP., New York, has been granted a charter of incorporation. H. Conroy, E. Prentice, Jr., and E. W. Franklin all of New York are directors.

AC

NEEDHAM ASSOCIATES, INC., New York, have been granted a charter of incorporation to produce fertilizers and chemicals.

AC

JAMES C. TOTMAN, Northern Chemicals Inc., Searsport, Me., has been named state chairman of Maine in the preparation to observe the third annual Chemical Progress Week, April 23-28, sponsored by MCA.

Equipment AND BULLETINS

Link-Belt Fertilizer Book

Link-Belt Co., Chicago, has issued a 16-page book describing and illustrating plants and equipment for the fertilizer industry. Photographs of installations illustrate the use of processing equipment, including dryers and coolers, nodulizers, mixers and vibrating screens. Arrangements for processing ammonium nitrate, superphosphate and granulated mixed fertilizer are shown.

•

New Valve Bag Packer

Black Products Co., Chicago, Ill., recently unveiled its new Black Diamond airflow valve bag packer. The packer, making use of the air slide principle of conveying material, is used in combination with a weight control mechanism, which has resulted in an automatic controlled weight bag filling device.

•

New Hardinge Pilot Plant Dryer

Hardinge Co., York, Pa., has introduced a selection of self-contained pilot plant or laboratory size Ruggles-Coles Rotary Dryers, which are available in three models.

All units are compact, mounted on a structural steel frame, and require only fuel and electrical connections to be placed in operation. They can be moved easily from place to place.

Model XH-XF is a single shell, direct heat, gas fired dryer, which can be arranged for either parallel or counterflow operation. This model is described in Bulletin AH-471.

Model XB is a double shell, indirect, gas fired rotary dryer, particularly suited for high temperature drying without contamination. Volatiles can be easily separated from the solids. Described in Bulletin AH-472.

Model XC is a steam tube dryer for small capacity operations. Described in Bulletin AH-473.

All models are offered in mild steel and stainless steel.

•

Hudson Offers New Display

H. D. Hudson Mfg. Co., Chicago, is currently marketing its new sales-maker display, described as "a complete sprayer and duster department in only 3 feet diameter space." With the purchase of the stand, other merchandising materials are offered at no extra cost.

•

New Hewitt-Robins Ag Screen

Hewitt-Robins, Inc., Stamford, Conn., has developed a new high-speed vibrating screen said to be 30 to 80 per cent faster than previous mechanical screens. The new screen, the "HS Vibrex," may be used for fine screening of sand, clay, fertilizers, chemicals, etc. It has a speed of 3300 rpm as compared with the past speed of 1800 rpm. Wet or dry materials may be screened.

•

Battelle Buln. on Molybdenum

A series of technical data bulletins on several classes of molybdenum chemicals is being prepared by Battelle Memorial Institute, Columbus, Ohio, under commission from Climax Molybdenum Co., New York. These bulletins will report the properties, methods of preparation and applications of these compounds:

Organic complexes of molybdenum; Molybdenum disulfide; Heteropolymolybdates; Cyanomolybdates; and the halides and oxyhalides.

Richardson Offers New Bulletin

Richardson Scale Co., Clifton, N. J., is currently offering a two-color, six-page bulletin describing three models of automatic weighing units for bulk materials. These scales are designed for handling dry, ground, granular, dusty and non-free-flowing materials. The bulletin discusses construction, operation, feeding and capacities of the scales.

•

ASCA Offers New Catalog

"Automatic" Sprinkler Corp. of America, Youngstown, Ohio, recently published a new illustrated catalog covering the various generally accepted methods of fire detection, prevention, control- and extinguishment associated with the field of special hazard fire protection. The catalog depicts every phase of protection possible for industry, inside or out.

•

New Filter by Arrow Tools

Arrow Tools, Inc., Chicago, has designed a new high-flow industrial filter for bulk handling of liquids, gases, diesel fuel, hydraulic fluids, gasoline, water, chemicals, oil and compressible fluids. Company engineers will submit filter specifications to meet particular requirements.

•

Buln on Granular Pesticides

A new issue of *Attaclay Pesticide Digest* covers pertinent points on the timely subject of granular pesticides. The entire Digest is devoted to granular pesticides in general, and granular pesticide control of European corn borer in particular. Specialized field application rigs for these materials are illustrated, and various mesh classifications are helpfully shown in actual size.

Free copies available from Minerals & Chemicals Corp. of America.

•

Sequestrene Bibliography

Geigy Industrial Chemicals, New York, last month issued a sequestrene bibliography (1953-1954) which contains the names of personnel in the industrial chemical and allied chemical fields, and their achievements for the period. Also listed in the bibliography are all the foreign patent applications for that year.

LOUISVILLE DRYERS are fitted to your job for faster, more efficient performance—lower cost in the long run!

PRE-TESTING IN PILOT-PLANT OPERATION TO ASSURE PERFORMANCE

LOUISVILLE METHOD

1. Initial survey and analysis of your particular problems.
2. *Pre-testing in pilot-plant operation to assure performance.*
3. Accurate design to meet your specific needs.
4. Top-quality fabrication in General American's own shops.
5. Follow-up checks after installation to guarantee mechanical perfection and efficiency.

PROCESS EQUIPMENT DIVISION
GENERAL AMERICAN
TRADE MARK

LOUISVILLE DRYING MACHINERY UNIT
GENERAL AMERICAN TRANSPORTATION CORPORATION
Dryer Sales Offices: 139 South Fourth Street • Louisville 2, Kentucky
380 Madison Avenue • New York 17, New York
General Offices: 135 South La Salle Street • Chicago 90, Illinois

Poulsen Equipment Bulletin

Poulsen Co., Los Angeles, offer a 22-page booklet describing plant processes and general plant equipment. The booklet details crushing and grinding equipment, blending and mixing units, material processing, handling & storage equipment for the fertilizer, clay, and insecticide industries.

Also reviewed are the Uni-blender fertilizer mixer, Uni-blender liquid formulating plant, the standard and dual compounding plants suitable for insecticide concentrates and dry, free flowing materials.

Known as general catalog #10, this booklet is available from Dept. AC, Poulsen Co., 2341 East Eight St., Los Angeles.

•

Gallowhur Adds New Line

Gallowhur Chemical Corp., Ossining, N. Y. announce the introduction of a new line of organic mercurial seed dressings. Simultaneously, Gallowhur announce the appointment of Larvacide Products, Inc., N. Y., as exclusive sales agents.

•

Water Soluble Fertilizer

Western States Chemical Corp. produce a water soluble phosphate field fertilizer, in a new $500,000 plant at Nichols, Calif. "GRO", which is the trade name for this new fertilizer is a finished product from basic materials. With new equipment throughout this plant the daily capacity at present is set at 250 tons which will be distributed throughout California and Arizona.

•

Diamond Improved Formula

Diamond Black Leaf Co., Cleveland, announced recently a new formulation for nicotine sulfate insecticide. The use of a chemical wetting agent in the manufacturing formula, the company reported, causes the nicotine sulfate to spread faster and more effectively over the plant surfaces.

•

New Liquid-Feed Blender

Patterson-Kelley Co., Inc., East Stroudsburg, Pa., announced recently its development of a liquid-feed blender for commercial processing. It is said to blend liquids and dry materials swiftly in one operation, retaining an even flow.

•

New Liquid Fertilizer

Continental Fertilizer Co., Nevada, Iowa, announced last month that Shur Green, a new concentrated liquid fertilizer for lawn and garden use, will be available to most areas in the Mid-West this spring. Different formulas are produced for various area nutritional deficiencies

Prater Issues New Catalog

Prater Pulverizer Co., Chicago, issued last month a catalog dealing with rotary airlock feeders. Descriptions of each Prater model are presented with specifications and dimensional drawings which can be used for layout purposes. The new blow-thru feeder, for feeding finely ground, free flowing products into pneumatic conveying systems, is covered completely.

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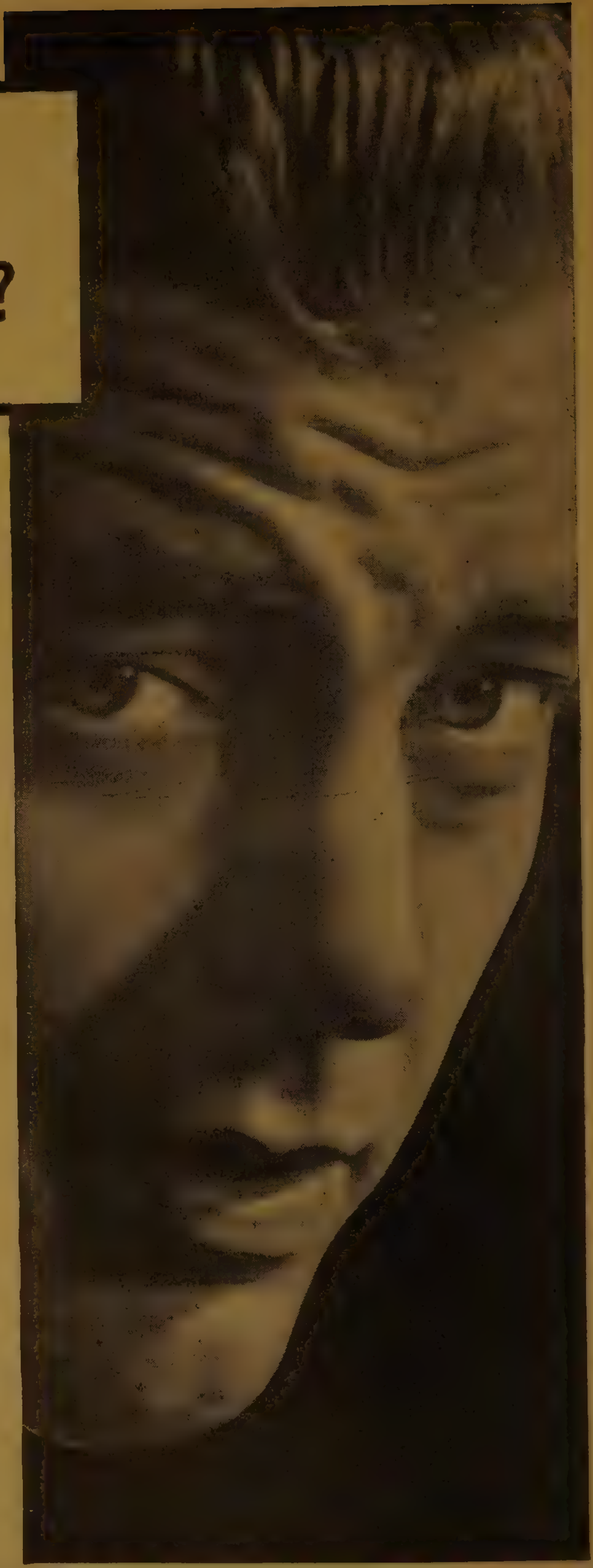

No ingredient that goes into your pesticide or herbicide formula can be ignored. The most effective toxicants will not perform at top efficiency if the solvent, for example, does not match them in quality.

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Noble's Applicator on Market

Noble Manufacturing Co., Sac City, Iowa, announced last month its granular DDT applicator, used in 1955 field tests on the corn borer control problem, is available to farmers. This applicator is a hopper-type unit, engineered to drop granular DDT into the corn whorls with a minimum of waste.

•

Fuller Introduces New Device

Fuller Co., Catasauqua, Pa., is currently offering a new material level indicator for process industries. The device, suitable for dry, pulverized, fine, crushed or granular materials, will operate, it was said, at bin temperatures up to 300 degrees Fahrenheit.

LIVESTOCK PESTS UP

(From Page 55)

counties. A survey of the infestation and damage by corn earworm to dent corn in Illinois shows that this pest caused an estimated average loss of 1.3 percent of the crop in 1955. The damage by the earworm in Illinois was much less severe in 1955 than in 1953 and 1954.

First Mexican fruit flies of the current season for the lower Rio Grande Valley of Texas were trapped in citrus orchards January 31. The appearance of this serious pest of citrus in the valley is considerably later than in the previous season when the first specimen was taken December 17, 1954.

Boll weevil hibernation counts in Chicot, Hempstead, Pope and Franklin Counties, Arkansas, show an average of 866 weevils per acre of ground trash compared with 224 weevils per acre in winter of 1954-55. Inspections of surface debris for pink bollworm were made in 3 counties of Arkansas, 1 in Oklahoma and 44 in Texas during the last half of January. Oklahoma and Arkansas counties were negative, while of 44 Texas counties 18 were negative. Nineteen percent of the fields inspected in Texas showed live pink bollworms. For the four lower Rio Grande Valley counties of Texas, live pink bollworm was found at rate of 1.6 per acre compared with 8.6 per acre for the previous year. Further up the coast in this State in Nueces and San Patricio Counties where drought conditions were more severe, inspections of debris thus far this year have shown an average of 251.9 live pink bollworms per acre compared with 9.2 in the winter of 1954-55.★★

NAC TO HOLLYWOOD

(From Page 37)

New York City; and a report of "Atomic Energy in Agriculture" by Dr. S. B. Hendricks, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md.

In addition to Mr. Larrick's talk and the presentation of Governor Collins' proclamation, the Friday, March 16, program will include a report on the NAC Association's "Read the Label" safety program by L. S. Hitchner, NAC executive secretary; "The Future of Fungicides in Agriculture" by Dr. George L. McNew, of Boyce Thompson Institute for Plant Research, Yonkers, New York; "U.S.D.A. Programs Affecting Pesticides" by Dr. H. L. Haller, Crops Research, USDA, Washington, D.C.; and "Research and Economics in the Cotton Industry" by Dr. H. G. Johnston, of the National Cotton Council, Memphis.★★

PENSACOLA PLANT

(From Page 41)

From the solutions mixing tank it is pumped into tank cars for shipment to customers under the trade name—Baysol.

Ammonium Nitrate Concentrates

FROM the ammonium nitrate solution tank the 83 per cent mixture passes into a concentrator. The concentration from 83 per cent to 95 per cent solution which is essential for pebbling is achieved by boiling the solution at about 280° F. under a partial vacuum.

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The solution leaves the concentrator by means of a high level overflow and is pumped to the constant head tank at the top of the prilling tower after passing through a steam heater to ensure a proper operating temperature of 280° F. From the head tank it flows to a system of spray headers that distribute it across the entire cross-section of the tower.

As the drops of solution fall through the tower they are met by a large volume of air being pulled upward by a series of fans. The relatively cold air chills the drops to form "pebbles" about the size of a bird shot. The pebbles are collected at the bottom of the tower on a conveyor belt and are transported to the drying system, which consists of a predryer, dryer, and cooler.

The dried pebbles go to a tumbler mixer where diatomaceous earth is added as a coating to prevent absorption of moisture upon storage. The coated ammonium nitrate concentrate is then screened, bagged, weighed and conveyed to storage or for shipment under the trade name Ammo-Nite.★★

EDITORIAL

(*Continued from Page 31*)

He estimates that current operating capacity of the ammonia industry is 4,143,000 tons from 43 plants, with 11 more plants scheduled for early completion, which will shortly shove capacity up almost to the five million ton mark.

We keep wondering where this growing flood of nitrogen products can continue to find a profitable market, even if agriculture stays relatively prosperous, and demand continues to expand. And we hate to think what could happen should demand unexpectedly turn downward, or foreign nitrogen supplies start to back up in the hands of producers and seek an outlet in the U. S. regardless of price.

NEMAGON FUMIGANT

(*From Page 47*)

ment, some work is going on to evaluate equipment for applying 20-30 pounds of granules without fertilizer per acre. Applications of Granules at dosages as low as 10-20 lb./acre have been made with Ganrud corn planter attachments and, with slight adaptation, satisfactory broadcast treatments at 20-30 lb./acre can be made with the Ganrud Spreaderette.

Scope of Use as a Soil Fumigant

NEMAGON has been applied to more than 45 crops in the United States and Hawaii. Although it is too early fully to assess the results of these tests, most are encouraging. In New Mexico the control of root knot nematodes by applications of Nemagon at ¼ gallon per acre in 40" rows doubled the yield of cantaloupes and at ½ gallon per acre nearly tripled the yield. The soil was extremely dry at the time of application and good results would not normally be expected. This would indicate that soil moisture requirements may not be critical for Nemagon.

Experimental results have shown that the species of nematodes below are controlled by Nemagon:

In addition to the list below, preliminary tests indicate that the fumigant will control other important species of nematodes.

The rate of movement and diffusion of Nemagon soil fumigant through the soil is satisfactory. As shown by S. T. Ichikawa, J. D. Gilpatrick, and C. W. McBeth in *Phytopathology*, October 1955 (*Soil Diffusion Pattern of* 1, 2-*dibromo-3-*

Meloidogyne incognita var. acrita	— root knot nematode
Pratylenchus penetrans	— lesion or meadow nematode
Pratylenchus pratensis	— lesion or meadow nematode
Pratylenchus vulnus	— lesion or meadow nematode
Ditylenchus dipsaci	— bulb or stem nematode
Heterodera schachtii	— sugar beet nematode
Heterodera cruciferae	— crucifer nematode
Tylenchulus semipenetrans	—citrus nematode

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chloropropane [Nemagon]), there is a steady increase in nematocidal effect from the second week following an application up until the ninth week. At the end of two weeks, root knot nematodes are inactivated for a distance 5″-6″ vertically and horizontally from an injection point 8″ below the surface. By the fifth week, the fumigant has spread 13″ horizontally and vertically and by the ninth week, 15″.

At the end of the first week, however, the fumigant has not killed the population of root knot nematodes noticeably, which points up one of its characteristics: Nemagon does not kill nematodes quickly. Mention was made of nematodes becoming "inactive" after being exposed to Nemagon, meaning that although they are not dead, it causes nematodes to cease their damage to roots. Microscopic observations show that as long as four weeks after exposure to the fumigant, root knot larvae appear to be alive; but they are unable to attack tomato roots. The reason for this is not known, but continuing research is expected to show exactly how the fumigant works.

Summary

It can readily be seen that Nemagon promises to be an important nematocide. The most outstanding features it offers are: (1) It can be applied to many species of living plants. (2) It can easily be formulated as granules or emulsible concentrates. (3) It controls most important species of nematodes. (4) It is economical to use.

In 1956, limited quantities of Nemagon soil fumigant will be sold by formulators throughout the United States for commercial application.★★

WASHINGTON REPORT

(From Page 69)

sweet potatoes. The guide for vegetables used for commercial processing is a total planted acreage for 2 percent more than in 1955.

In total, the 1956 guides for 16 fresh summer vegetables call for nearly half a million acres to be available for harvest —slightly under last year.

* * *

The National Agricultural Chemicals Association is readying another in a series of radio features for distribution to stations throughout the United States, on a request basis only. The latest series features the importance and use of fungicides. Oftentimes, when pesticides are discussed, the attention is focused on insecticides. This is partly because of the many startling and well publicized developments in the insecticide field, and because the bugs just make more noise than the quiet, silent attack of plant diseases, which don't rate as high when it comes to "spectaculars."

The new series, made by some of the nation's outstanding authorities in the field, features the following: "High Cost of Plant Diseases," Dr. John C. Dunegan, research specialist, U.S. Department of Agriculture; "Champions Fall Hard," Dr. James G. Horsfall, director, Connecticut Agricultural Experiment Station; "Food Protection Network," Dr. Paul R. Miller, plant pathologist, U.S. Department of Agriculture; "Plant Disease Control for the Home Gardener," Dr. W. D. McClellan, research specialist, U.S. Department of Agriculture.

Donald L. Miller, NAC editor, says the series is meeting with an enthusiastic acceptance among the nation's leading radio farm directors as well as other stations not having staff farm specialists. The fungicide radio features have been designed to appeal to both farmers and home gardeners.

It is expected that additional recordings will be offered to stations during the seasons when pesticides are normally in greatest demand.

* * *

The Food and Drug Administration is face to face with the problem of establishing tolerances for pesticides in milk and meat. The BHC Committee of the National Agricultural Chemicals Association has petitioned the Food and Drug Administration to establish a tolerance for lindane in milk, meat and forage crops. Food and Drug Administration officials freely admit that—this is it!

This is, in their opinion, a most difficult decision to make, and one which may require quite a bit of time. Certainly the agency will call upon the very best advice it can get. Thus, far, tolerances have been established for a number of chemicals in animal fat, but not in meat itself.

Crux of the problem, of course, is the use of pesticides on forage crops. While the measurement and control is in the amount of residue in the finished products, the source of the chemical is with the forage crop itself. Because of the very nature of these crops, and the way they are handled and stored for use on the farm or on the way to market, tremendous variation occurs in the amount of residue to be expected in the resulting animal products.

What's more, the whole field of grassland agriculture is undergoing tremendous change. A number of very active groups in this country are busily engaged promoting the increased planting of forage crops. Furthermore, additional information is being developed to increase production of these crops through the use of pesticides.

It may well be that the Food and Drug Administration's decision on milk and meat will be the real indicator of what you can expect from now on in the way of residue tolerances.

* * *

Agricultural experiment stations in the nation are working to obtain additional residue data. The four regional groups of experiment stations —northeast, northcentral, western, and southern—have projects and studies on pesticide residues. In the northeast, for instance, some of these studies include work on forage crops and on mixtures of pesticidal chemicals. This work has a bearing on the Miller Amendment, Public Law 518, and on what the states recommend.

Everyone admits much more residue data is needed, but in general, the feeling is that things are going along better than had been expected.

* * *

One of the stories that may well be circulating around Florida hotels during the NAC convention concerns a well-known Washington scientist, Dr. H. L. Haller, assistant director, Crops Research of the U.S. Department of Agriculture, and why he was caught reading the *Police Gazette* for the second time. In talking to Dr. Haller we learned that the February issue of this outstanding publication carries another scare story about food poisoning from pesticide chemicals. The article bases part of its material on the 1950 Congressional Hearings and includes nothing about the Miller Amendment designed to offer full protection to the public.★★

GARDEN SUPPLY SHOW

(*From Page* 93)

come from the Chicago Sanitary District's sewage disposal plants. Also shown was a complete line of dusts, sprays and weed killers. Art Mohler, sales manager, in charge.

Ra-Pid Gro Corp., Dansville, N.Y., displayed their "Ra-Pid Gro" all purpose concentrated plant food with vitamins and trace minerals for foliar feeding. E. D. Evans, sales representative, said the product has been on the market for over 40 years and that when first offered for foliar feeding some years ago this pioneer idea got some rather rough criticism from sceptical scientists. "Getting a fine reception now," he added, "and the scientists are now on our side."

Associated Seed Growers, New Haven, Conn., is gradually expanding their line of small package garden chemicals which was launched about two years ago. A new rose dust using karathane to replace captan was given its first showing. A new chlordane dust was also featured. Both are packaged in 12 oz. dust gun containers. Other new formulas for the small garden dealer trade are in process of development, he indicated.

Bridgeport Brass Co., Bridgeport, Conn., pioneer areosol manufacturer, has added a new "Slug-A-Bug" non-toxic pyrethrum bomb to their line of over 20 aerosols, according to Walter E. Anderson, sales manager, aerosol products division.

Diamond Black Leaf Co., Cleveland, Ohio, introduced four new pesticides—Black Leaf 40, improved with a new wetting agent; a new rose dust in duster can; new double duty aerosol, "PFFT," (say "fit") for household pests and garden insects; and a new herbicide for lawn weeds and poison ivy. Dieldrin is now offered in granular form for lawn insects, and a fly and insect spray is packed in a handy areosol can. Lithographed metal containers are being used for

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many products, a spokesman said, and an extensive advertising campaign is under way in four home and garden magazines and local newspapers across the country. Arlene Francis also sells Black Leaf products on 55 TV stations. Denis Hayley, assistant sales manager, house and garden sales, in charge.

Boyle-Midway, Inc., New York, featured an aerosol for African violet and other household plant insects, along with rose spray, ant and roach bombs, cutworm, snail and slug bait, a dog repellant and other specialties.

Among other manufacturers of chemicals for garden use in the huge show were the following:

Armour Fertilizer Works, Chicago Heights, Ill., Getzum Products, Sumner, Wash., O. E. Linck Co., Clifton, N. J., Lawn-Gro, Inc., Winona Lake, Ind., Smith Agricultural Chemical Co., Columbus, Ohio, Faesy & Besthoff, Inc., New York, Carajon Chemical Co., Freemont, Mich., Stim-U-Plant Laboratories, Columbus, Ohio, Rose Mfg. Co., Beacon, N. Y., Borden Co., chemicals div., New York, Carbide & Carbon Chemicals Corp., N. Y., B. F. Goodrich Co., Akron, Ohio, Science Products Co., Chicago, Swift & Co., Chicago, and Standard Oil Co., Chicago.

H. D. Hudson Co., Chicago, displayed their line of sprayers and dusters for hand or power use and featured a "Salesmaker" display rack for dealer use, along with store banners, and window decals.

John Bean div., Food Machinery & Chemical Corp., San Jose, Calif., demonstrated high pressure power sprayers, also sprayers operated by hand, gasolene or electric power, knapsack sprayers and other types of applicators. Garden sprayers were also shown by Hayes Spray Gun Co., Pasadena, Calif., Sprayer Nozzle Sales, St. Petersburg, Fla., and Bradson Co.., Inc.

CUSTOM SPRAY SCHOOL

(From Page 92)

reported G. C. Decker of the Illinois Natural History Survey: (1) Read labels and follow recommended and approved practices to the best of their ability. (2) In so far as possible, control insects, pests and diseases early in the season. (3) Never use highly persistent or otherwise questionable materials late in the season.

At harvest time in the fall of 1954, the Survey obtained apple samples from 21 Illinois apple orchards for DDT residue analysis, Dr. Decker reported. In one orchard the grower had applied excessive amounts of DDT 10 days before harvest and his crop showed a residue of 8.48 p.p.m., which is 1.48 p.p.m., over the tolerance. The other samples were all well within the tolerance, 18 being less than 3.5 p.p.m., or half the tolerance. Since DDT is perhaps the most persistent of the newly developed insecticides, it would appear that with a little care most growers should have little difficulty in meeting tolerances.

It is not necessarily true that tolerances established for two or more pesticides properly reflect the hazards involved in the use of these materials or that you should, therefore, always choose the material with the higher tolerance, explained Dr. Decker. In most cases, the most toxic materials are used at much lower dosage rates, and very often their residues disappear much more rapidly. Thus, in many cases the danger of exceeding the established tolerance will be greater if the pesticide with the higher tolerance is used.

Furthermore, the established tolerances do not necessarily truly reflect the relative toxicity of any two or more pesticides. The Food and Drug Administration has always taken the position that, whether or not an actual hazard is involved, the amount of a pesticide residue permitted on a raw agricultural product should be held to the minimum required to obtain control of the pest involved. Thus, a pesticidal chemical which might be regarded as safe with a residue of 3 p.p.m. may have a tolerance established at only 0.1 p.p.m. because the available performance and residue data showed that the pest involved can be effectively controlled and that the grower can still meet the

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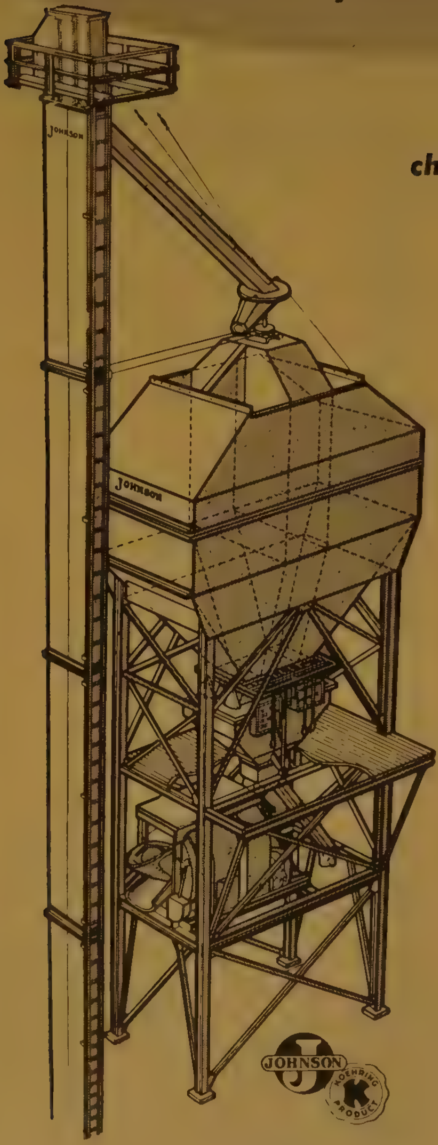

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- It pulverizes, screens, batches, and blends materials in one continuous-flow operation.
- Enclosed bucket elevator feeds materials to top of the plant at a rate of 1,000 cu. ft. per hour.
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- Johnson 100 to 200 cu. yd. Portable Section Bin, shown here, accommodates five materials — has four sections arranged around a central compartment.
- Bin feeds materials into a Johnson multiple-material weigh batcher, equipped with a 5,000-pound dial-head scale. Batcher accurately weighs up to five (or more) fine-grained materials.
- Solution weigh-batcher can be installed on the batcher platform.
- Mixer, for final blending operation can be installed on elevated platform, as shown, or at floor level to reduce plant height.

Owned and operated by leading fertilizer manufacturers, Johnson blending plants offer you a low-cost way to batch and blend materials to exact specifications. Whether you are interested in complete installations, or want to modernize existing facilities, check with us. All types, sizes of plants and auxiliary equipment available. Write today.

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established tolerance of 0.1 p.p.m.

Use of 2,4-D or MCP in grain fields with legume-grass seedlings is helpful in control of weeds in hay fields and improved pastures, K. P. Buchholtz reported. Use of no more than 0.25 pound of amine preparations of either herbicide per acre should give acceptable control of weeds without undue injury to the legumes. Applications of 4 pounds of Dalapon per acre were suggested in controlling grassy weeds in seedling stands of birdfoot trefoil. It can also be used for alfalfa and sweet clover seedlings, but other clovers are too sensitive to allow its use. Dalapon prevents the establishment of a grass with the legume and it does not control broadleaf weeds. Broadleaf weeds may be controlled by DNBP. Applications of 1 to 3 pounds of dinitro per acre were suggested by Buchholtz where chickweed was a problem. If grasses are not present, 1 to 3 pounds of CIPC per acre would do an acceptable job.

Mr. Slife pointed out that there is little research data available to ascertain what the real potential of minor elements may be when included in dust mixtures of 2,4-D. Experimental data so far has indicated no significant difference between treated and untreated areas. Results from using the material in controlling weeds are reasonably good.

S. W. Melsted outlined two methods by which custom applicators can help farmers estimate the nitrogen requirements for various cropping systems. Earl R. Swanson and Wendell Bowers, of University of Illinois, outlined economic and equipment problems involved in application of liquid fertilizer. Mr. Bowers reported that stainless steel is the only metal that is completely successful in handling all solutions.

Soil insecticides as an insurance measure were recommended by J. H. Bigger of the Illinois Natural History Survey. During 1955, with tests of 94 comparisons on 54 farms, aldrin and heptachlor treatments gave very similar results, with a 5 and a 4 per cent increase in plant populations respectively. Seed treatment with dieldrin or lindane resulted in a 3 per cent increase in plant population on 9 fields tested. There were 6 cases where both soil and seed treatments were compared in the same field. In these, seed treatment resulted in a 4 per cent increase in plant population, while soil treatment produced a 6 per cent increase.

A trend to granules was reported by Dr. Bigger in use of soil insecticides. He said that ease of application is attracting many farmers. Attachments right on the corn planter make it possible for the material to be covered right at planting time, saving the additional operations of spraying and disking in the liquid material. Applications should be covered within two hours after application, he pointed out.

2, 4-D and MCP are clearly the most effective growth-regulating herbicides available for use on Canada thistles, advised Dr. Buchholtz. They usually give equivalent results when applied at equal rates. 2,4,5-T, however, is less effective. Preparations of amines have been about as effective as the esters when applied at equal rates. Application is most effective in the early bud stage.

The most promising new chemical for use on Canada thistles is amino triazole (ATA), reported Dr. Buchholtz. This chemical is most effective when applied to the thistle foliage in the pre-bud stage at the rate of 4 pounds per acre. The action of ATA is much different from that of 2,4-D. The most conspicuous response is a bleaching of the chlorophyll from the leaves. Treated plants will be nearly white in color or will show various reddish colorations. After a period of several weeks, the treated tops will turn brown and die. New shoots that come up are likely to be lacking in chlorophyll, and these also will die. The most favorable treatments have given 90 per cent or more control of Canada thistles.

ATA is not selective in its action, commented Dr. Buchholtz. All plants show bleaching of chlorophyll following an application. Applications should be made carefully for any drift of spray is certain to leave conspicuous traces for weeks.

When the Canada thistle growth occurs early in the spring, it is possible to treat infested areas with ATA, and perhaps a week later work up the area and plant some warm-weather crop. There is not much residual effect.

DDT at 1½ pounds per acre or toxaphene at 1½ to 2 pounds per acre and dieldrin at ¼ pound per acre were the treatments recommended by Steve Moore III, extension entomologist, for adequate control of green cloverworms which attack soybeans. Insect attacks on soybeans are getting more severe, he reported.

Randox was recommended by Mr. Slife for trial use in 1956 for control of grasses in soybeans as a pre-emergence chemical. It lasts longer than many of the others under dry conditions. Because soybeans have a tolerance to it, there is no need to worry about loss of stand. Dinitro, CIPC and alanap are recommended at 6 to 8 pounds per acre as a pre-emergence chemical on heavy soil types. They should not be used on light soils.

Three years of research results indicate that yields will not be reduced by applying ⅛ pound of acid in amine form on soybeans three to five inches tall to control certain broadleaf weeds. This treatment is designed primarily for bottomland areas where cockleburs, ragweed, and annual morning glories are the primary problem, advised Slife.

The day prior to the formal school, the Illinois Aerial Applicators' Association met and re-elected Robert Bankson of Blue Mound, Illinois, as president. Along with their business meeting, Dr. Walter Mumm of Crow's Hybrid Seed Corn Company discussed how his company had used an airplane effectively in their company. Drs. Brindley, Decker, and Luckmann discussed granular DDT application for corn borer control and aerial application of insecticides.

The Illinois Ground Sprayers' Association re-elected J. Garland as president and A. E. Pickard as secretary-treasurer. Plans were made for better service to the membership.★★

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AGR INDUSTRY CONF.

(*From Page 90*)

stack of factual data 8½ x 11 inches by 1½ to 2 inches thick, containing data on toxicity, medical, micro, chemical, tracer techniques, and others needed for the pesticide, would embrace the 3-year study of a group of fine scientists costing $100,000 or more; the field-testing of the compound, replicated and on different varieties, in different localities, and under different growing conditions - $400,000 due to travel - "taking the work into the field"; residue and analytical work, $350,000; necessity for use $50,000. There is a great need for a closer spirit of cooperation between individuals and university and college personnel, to secure specific information on crops and varieties, to secure information for certificates of necessity for use; and to determine the potential place for the projected product in marketing channels. One of industry's current problems is that of obsolete merchandise still on dealers' shelves - complete with old labels; one recent survey showed a good share of such stock was from 4 to 5 years old. Dr. Gardner concluded with the observation that the Miller Law will help to raise the professional status of sales representatives.

"One of the problems of the processor is at the receiving station," stated D. L. Bischoff, Raw Products Section, Washington Canners Co-operative, Vancouver, Wn. If there is no tolerance on a pesticide for a particular commodity, will he then be obligated to turn down produce of unknown pesticide history, or that which has originated at an Experiment Station field trial? How is it possible for a processor to determine residues at the receiving platform, and is there a sure-fire, rapid analytical method he can use?

The cherry fruit fly is another difficult problem. Recommendations call for use of different pesticides at different dates - depending on "days before harvest"; but on cherries, the processor may have to change his date of picking to correspond with market trends. Thus a cherry grower may have two choices open to him - 1) control the pest - with the possibility of having illegal residues (if harvest date is shortened); or 2) have worms and be sure to have the crop turned down. Strawberries are susceptible to a number of rots and molds in the field, both of which can cause considerable economic loss if not controlled adequately. To be effective, certain of the fungicides used to combat these problems need to be applied near or during harvest, thus complicating the residue situation. Many processors, as a grower service, stock quite an inventory of pesticides. "As the Miller Law is now set up, many more products would have to be stocked, increasing the amount of inventory and adding to the overhead," he concluded.

Symphylids

THE following morning a panel discussion on Symphylids was moderated by Chuck Starker, Pacific Supply Co-op, Portland, and featured Dr. A. G. Howitt, Western Washington Experiment Station, Puyallup, and H. E. Morrison, Oregon State College, Corvallis. Panel members outlined the regional history of the pest and showed Kodachrome slides of the animal and typical injury on a number of crops. A brief resume of early work with soil fumigants, followed by that with the chlorinated insecticides, and finally the most recent activity with phosphate materials - particularly parathion - was discussed. Currently, while parathion looks most promising under a number of conditions, there are the provisions of the Miller Bill to consider. Growers were urged to check with their processor before attempting to use this pesticide.

Weed Control

"GOOD Weed Control is based on 1) use of a good product, 2) correct recommendations, 3) correct application" J. R. McCambridge, Chipman Chemical Co. told the group. He then reviewed the development of the use of chemical herbicides from the days of chlorates - when rates of "tons per acre" were used, through use of dinitro selective, where the product was used at 100 gallons per acre; and now with 2,4-D where as little as 1 gallon per acre is used by plane, or 3 to 5 with ground sprayers. This certainly brings out the necessity for precision application equipment for satisfactory results. The agricultural chemical industry needs to do a better job of public relations, McCambridge continued, "our technical men are equal to those in the medical profession - they analyze the problem and recommend a cure for the situation. Industry men in research and development need to be known to the general public."

Safety and Pesticide Control

"SAFETY in pesticide usage is not an individual company function", Mr. C. O. Barnard, executive secretary, WACA, remarked. "It is something which involves us all." He discussed his recent presentation of the idea of cooperative action on Safety in Pesticide Usage to several trade associations and regulatory agencies at the convention of the Association of American Pesticide Control Officials. This action, it was hoped, would later result in a widespread campaign to promote safe practices during and after application of hazardous or injurious pesticides. "The proper disposal of "empty" pesticide containers is of paramount importance", Mr. Barnard continued. He pointed out also what could and has happened where proper disposal was not made.

Insect Resistance

DR. P. O. Ritcher, Oregon State College, Corvallis, Ore., outlined the history of insect resistance dating back to Melanders' report in 1914 of the resistance of San Jose' scale to lime sulfur. Pests which have developed resistance usually have numerous generations per year, and a suprisingly large number affect man and animals. Resistance is presumed to develop from the pressure of insecticide usage and "selects" resistant forms out of a population which originally included forms varying in susceptibility to the insecticide. Inheritance of resistance may involve one

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or several genes and may vary in stability. Dr. Ritcher noted that the development of resistance might be slowed down by 1) switching from DDT to organic phosphates; 2) rotating materials before resistance develops and 3) the use of other control measures besides insecticides - sanitation, parasites and predators.

Dr. Roy A. Young, Oregon State College; discussed rates of fungicides used this past season. In reviewing some more recent approaches to disease protection and control, he reported that "Certain anti-biotics may be translocated upward in some plants and may move to desired plant parts and give assistance in certain types of infection".

Mr. Wm. I. Zeigler, American Cyanamid Co., Portland, Ore. was elected chairman for the 1957 industry conference, succeeding E. Turner. Program committee members included Carl Tanner, California Spray Chemical Co., C. O. Barnard, WACA and Keith Sime, Chipman Chemical Co. Warren Newall, Naugatuck Chemical Division, was in charge of arrangements.★★

NW VEG. INSECT CONF.

(*From Page* 89)

others. The addition of urea or other stabilizing agents to these pesticides did not increase their efficiency.

Potatoes

Demeton was effective against the green peach aphis on seed potatoes in southern Oregon. Diazinon and endrin gave good results when applied with a specially designed applicator. In central Washington, continued resistance of this aphis to parathion was reported. Parathion or endrin sprays gave better control than dusts. Diazinon dust was better than spray. Schradan and Demeton reduced the aphis population for the first three days. Parathion gave good control of wingless aphis after summer migrations, but was ineffective during migrations. Seed pieces treated with Demeton or Schradan kept aphis-free for the first 21 days. In Oregon, Demeton and Phygon used as a

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Pea Pests

American Cyanamid 3911, Chlorthion, parathion, American Cyanamid 12008 and malathion were all about equally effective against pea aphis, and also gave comparable results when used against the pea moth in northwest Washington field tests. A new wrinkle in pea aphis control, by an attack on over-wintering forms, was attempted in the Walla Walla, Washington area where 1,800 acres of alfalfa were sprayed with ground equipment, using malathion at 16 oz. per acre. An estimated 80% control was secured, and the general aphis population on 9,300 acres of alfalfa reduced 40%, which cut down later aphis migration into pea fields considerably. In July, some 20,000 acres of peas were sprayed with parathion, considerably less acreage than is usually treated. The incidence of virus diseases was also very low, in spite of the very late season. In toxicity tests in that area against pea aphis, 2 oz. American Cyanamid 4124 was equal to 4 oz. Diazinon, or 4 oz of chlorthion. Under cool, fall conditions 6 oz. chlorthion was slightly better than 18 oz. malathion.

Small Fruit, Ornamental Pests

Aramite was slightly better than chlorobenzilate against dry berry mite of bramble fruits in western Washington. Dormant use of dinitro weed killers was also effective in reducing populations of cyclamen mites on crowns of strawberries in that same area. Heptachlor, aldrin and chlordane all gave complete control of Narcissus bulb fly at Sumner; dieldrin was also effective. Preplant dips of heptachlor were found to give protection for a 2-year period, if bulbs were not dug at the end of the first year. Heptachlor was found to give best control of Strawberry root weevils when primroses were used as a test plant.

1956 officers for the conference will be chairman, Dr. W. C. Cook, ARS,USDA, Walla Walla, Washington; co-chairman Harry Andison, Canadian Dept. of Agriculture, Victoria, B. C.; and secretary, Howard E. Dorst, ARS, USDA, Logan, Utah.

WESTERN SPRAY PROJECT

(From Page 88)

Apples and Pears

At Hood River, FW 293 gave superior control of European red mites on Newton and Delicious apples. In the emulsifiable form it gave excellent control on Anjou pears, but caused damage on fruit; some russeting was noted on Mitox and chlorobenzilate plots. FW 293 exhibited considerable residual action. In comparisons of aramite and FW 293 at Yakima, FW 293 was slightly better, but caused some fruit damage on pears. At Riverside, California, 293 and Mitox were superior to FW 293 against European red mite on Delicious apples. Ovotran gave good control, but caused some necrotic foliar spots. PW 293, R 6199 and Systox all gave good control of two-spot mites on Bartletts.

Tests with 12 organic phosphates, including 5 systemic materials, against mites on pears at Medford, showed serious foliage injury and no commercial control on all plots where these materials were used; plots with non-phosphates (aramite, chlorobenzilate, FW 293 and dimite wettable) all gave good control. FW 293 produced considerable injury to the foliage in some tests. Five applications of Maneb controlled all mites present but clover, and seemed to stimulate trees, producing large, well-colored fruit. Karathane was best of all, giving good mite control, fine foliage and fruit coloration and stimulation of tree growth. In Colorado, DDT failed to control codling moth. Malathion or parathion had to be used in two applications to check worms. DDT was reported as less effective than in prior years. At Yakima, suspected codling moth resistant blocks had less than 1% infestation. Here Ryania appeared a little better than DDT, and was satisfactory. In California, alleged DDT resistance of codling moth was checked in the field, and properly timed applications of DDT gave good control. At Hood River, DDT at usual rates still controls this pest.

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Delayed dormant applications of either lime-sulfur or polysulfide plus dormant oil; or any of the standard organic phosphates added to the usual codling moth sprays at ½ strength used against spider mites gave control of pear psylla at Medford. If these sprays were omitted, commercial damage was likely to result.

Health Hazards

Sodium DNOC was checked in the Wenatchee valley by public health personnel who found this material not to be a health hazard under conditions of use in that area—this is in contrast to use in Europe, where several fatalities have been experienced. The exposure in Wenatchee was considerably less because of shorter work hours, more dilute solutions, and the application of less material per worker per season.

Residues

USDA personnel analyzed a large number of apple and pear samples taken in the field. Even where heavy applications of DDT were made, the residues at harvest were all below 7 ppm.

1956 project officers selected were chairman—L. C. Terriere, Oregon State College, Corvallis; co-chairman, George F. Knowlton, Utah State College, Logan; and secretary, Anthony S. Horn, Univ. of Idaho Extension Service, Boise, Idaho.

FERTILIZER VIEWS

(*From Page 58*)

vinced that the usage of commercial fertilizers at even the conservative rates of application recommended by their respective agricultural experiment stations would raise their net incomes. For many years the efforts of agricultural county agents, extension agronomists, agencies of government, farm press and the sales promotional staffs of private industry have been presenting experimental data and other proofs to demonstrate that it pays handsomely to use more fertilizer per acre. But still, a large percentage of farmers seem to remain unconvinced. How to explain this situation?

The problem is not peculiar to our own country. Reports from Europe reveal the same number of doubting Thomases there as here. A meeting held in London during the past spring and sponsored by the Fertilizer Manufacturers' Association and the Superphosphate Manufactuurer's Association devoted itself to the theme: "Fertilizers and the Profitability of Farming." The audience was drawn from banks, government departments, research stations, agricultural economics departments, the farm press and the British Broadcasting Company. The purpose was to stimulate interest in how fertilizers could be used effectively to lower farming costs and raise farm profits. The most convincing proof of the value of fertilizers in raising farm profits was given by two practical farmers, one of whom was the new Chief Adviser to the Ministry of Agriculture. Their experience and knowledge that fertilizers can and do increase farm profitability rammed the facts home most tellingly.

Such educational meetings are very much worthwhile. Our own fertilizer industry should initiate and encourage educational ventures of this kind in all regions of the country. We know that numerous get-togethers are held in many states during the year to which farmers and dealers are invited. The effort must be steadily continued. The scale and scope of such meetings can be widened and agendas improved. Practical farmers should be selected to

	Kilograms per Hectare			
	N	P_2O_5	K_2O	Total
Netherlands	74.5	52.0	70.2	196.7
Belgium	57.1	50.0	77.7	184.8
Iceland	69.4	31.7	26.4	127.5
Germany	31.0	32.1	58.4	121.5
Norway	33.6	36.7	46.0	116.3
Denmark	26.0	31.4	51.2	108.6
Luxemburg	25.8	40.8	37.5	104.1

appear among the speakers. The help that banks may offer to enable smaller farmers to invest more adequately in fertilizers should be a prominent feature of these meetings. Some may fear that the purpose of these meetings will be cynically or sordidly interpreted, that is, the implication that the industry thereby is selfishly promoting its own sales and profits. Let no one fear this. For the net effect, if the aim is achieved, is to serve the national interest. More efficient farming is in the national interest and if in doing this the fertilizer industry also benefits, the position of the industry is ethically sound. Let us increase the number of educational programs. The Green Pastures campaigns which are conducted in Kentucky and in New England may be considered as prototypes of the type meetings we have in mind.

Fertilizer Consumption Rates

IT is always interesting to see comparisons of the amounts of commercial fertilizers applied on the average in different countries. The Organization for European Economic Cooperation (OEEC) recently released data on consumption of fertilizers in several European countries for the 1953-54 fiscal year. These data are tabulated (Pg. 136). They are given in terms of kilograms per hectare for each of the major nutrients. (1 kilogram = 2.2 lb., 1 hectare = 2.5 acres) (Kgm/ha x 0.9 = lbs./acre.)

The OEEC commented that the trend in the Netherlands is for a higher rate of consumption in the 1954-55 period and would equal a total of 200.2 kg. per hectare divided up as follows: 77.1 kg. of N., 50.7 kg. P_2O_5 and 72.4 kg. of K_2O per hectare.

The highly vocal champions of organic fertilizers in this country and elsewhere who like to believe that commercial fertilizers ruin soils and damage health should ponder this high consumption of chemicals in Dutch soils. No one knowing the robust health and general vigor of Hollanders could be made to believe chemical fertilizers, used so abundantly in Dutch farming, have damaged the health of that nation.★★

FUNGICIDE REQUIREMENTS

(From Page 45)

residue data for every pesticide on every crop grown in their own state. Nor can the manufacturer be expected to obtain these data in each of the 48 states. Neither can he operate under different interpretations and regulations of the federal legislation by each of the 48 states.

The ultimate purpose of the field testing, residue studies, and toxicological investigations conducted by the manufacturer is to enable him to write an acceptable, accurate and intelligent label. The label must accompany the product when it is offered for sale. It is in effect a legal obligation on the part of the manufacturer that the product be effective for the purposes claimed and if used according to the directions it must not result in residues exceeding legally established tolerances. These labels are carefully scrutinized by both the U. S. D. A. and the Food and Drug Administration, and by the legal, research and sales departments of the manufacturer. The best advice industry can give to those making fungicide recommendations and to the growers who are using the product is "Read carefully and follow explicitly the directions for use on the label."

Cost of Product Research

THE research and development cost of a single fungicide has been estimated to range from 750 thousand to 1-3/4 million dollars. This figure will vary depending on the nature of the compound and the difficulty that is encountered in developing the manufacturing process, the formulations, residue methods, the toxicological data, and performance data. One company reports it is spending $500,000 annually in fungicide research and development. It has been reported by several industrial chemical concerns that the research and development costs on agricultural pesticides per dollar sale of these materials is roughly twice the cost of

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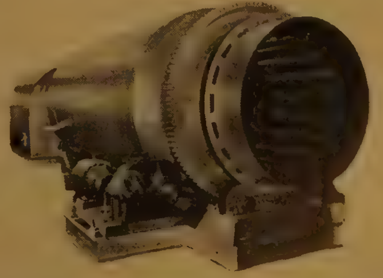

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these expenditures for their general line of industrial chemicals. Whereas the average company's research budget may run 4 to 5% of sales of its general line, it is not at all uncommon for the research and development costs on agricultural chemicals to run 8 to 10% of the dollar sales volume. At any rate, the costs are extremely high and they are borne almost exclusively by the chemical manufacturer. The high cost of agricultural chemical research and development is a matter of great concern to the research directors and the corporate management of any of the companies engaged in this business. These costs have undoubtedly kept many companies from getting into the agricultural field and have caused others to curtail or drop their activities entirely.

We may well wonder why any industrial chemical company would continue its efforts in the agricultural chemical field. Perhaps a partial answer is the desirability of a diversified chemical operation. Probably more important is the recognition that a prosperous agriculture offers a tremendous market for chemicals other than pesticides. Included among those chemicals that are either directly or indirectly important in the farm market are plant food constituents and fertilizer intermediates, lubricating oil and fuel additives, paints, textile, leather and food processing chemicals, etc.

Plant diseases of all kinds cause an average loss in the U. S. of at least 3 billion dollars annually. It has been conservatively estimated that there are about 7000 fungi, 175 bacteria and 163 viruses that attack plants. At least half of this loss on economic crops is caused by fungi which could be controlled with the diligent use of presently available fungicides and control measures. While we still have a long way to go, it is obvious that fungicides are making a worthwhile contribution to the prosperity of American agriculture.

We should not overlook the important role the salesman plays in meeting our fungicide requirements. The increasing complexity of the agricultural chemical field has necessitated a corresponding increase in the level of technical training and experience possessed by men in the capacity of salesman. The salesman's main objective is to get the order, but it is well known that he won't get it unless he can demonstrate to the farmer that his product will do a satisfactory job for the money. If he doesn't do this he most certainly will not get the repeat order. The local distributor and dealer are also key men in meeting our fungicide needs. Their experienced salesmen are in daily contact with the grower in his field and orchard. But even more important, the dealer has the fungicides in stock close to the farm where they will be needed. Very few farmers today are more than a few minutes away from a complete stock of reliable pesticide materials. In a matter of hours the farmer can usually cope with any emergency that may arise.

I saw a slogan in the office of one of our distributors which said—"Nothing happens until somebody sells something." Someone else has said—"The salesman is the backbone of our American economy." These maxims certainly apply in the fungicide business. In the final analysis unless the fungicide can be sold successfully, there will be no need for a production plant, administrative personnel, and the people engaged in the manufacture of the material. Investigators and industrialists alike are aware that the farmer who uses the fungicide must realize a profit from its use, and the manufacturer must realize a profit from its sale. This principle is axiomatic in the American business world. Without the profit incentive the vigor of the industrial economy of this country and the world would soon stagnate. The net profit realized from sales will in a large measure influence the amount of money and effort which will be

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reinvested in further research and development on new agricultural fungicides.

"Where do we go from here?" I think we can justifiably look forward to some startling advances in plant protection chemicals in the next decade or two. The pharmaceutical industry is opening this vista with the antibiotics which are promising for the control of certain bacterial and fungus diseases of plants. Systemic fungicides without doubt offer promise for the control of certain heretofore uncontrollable diseases and the possibility of more effective and practical control of some we are even now handling reasonably well. I believe it is naive to think these advances will come quickly and easily. I predict that our accepted concepts of plant disease control through the use of surface protectants and eradicants will be with us for some time. We now call the "squirt gun botanist" a plant pathologist and we have teamed him up successfully with the organic chemist and the agricultural specialist. But to an alarming extent we are still depending on empirical cut and try methods in much of our agricultural research. I sincerely believe that further and really significant advances in fungicides will have to be preceded by a significant improvement in our understanding of the basic concepts of the nature of fungicidal action and the fundamentals of host-parasite relationships, including their physiological and biochemical behavior.

It is not always easy to convince practical farmers, public administrators, or corporation executives of the importance and necessity of fundamental research. There are some encouraging movements in this direction. This thinking needs to be encouraged, otherwise our applied research will eventually reach the dead end of a one way street.★★

THE GRANULATOR

(From Page 36)

lumps on the distributor. The heat of solution of ammonia in the water raised the temperature in the vicinity of the distributor above the freezing point.

As illustrated by test J-5, operation under these conditions was very good. The material from the granulator contained only 2 or 3 per cent fines. The cooled product was 91 per cent onsize after the oversize was crushed. Loss of ammonia was only 1.5 per cent. There was no fuming when 5500 cubic feet of air and 190 pounds of water were used. There was only slight fuming when the air rate was reduced to 2800 cubic feet and the water rate was reduced to 140 pounds per ton of product.

In all of the tests in which all of the nitrogen was supplied as anhydrous ammonia, the moisture content was less than 5.0 per cent without artificial drying. The moisture ranged from less than 1 per cent up to about 4.5 per cent, depending largely on the input moisture content.

Several tests were made in which phosphoric acid rather than concentrated superphosphate was used to supplement the P_2O_5 from ordinary superphosphate. Nitrogen was added as anhydrous ammonia. Water, which was required for granulation, was added in an air-atomized spray on top of the material in the ammoniator.

Test J-6 is typical of operation with phosphoric acid and anhydrous ammonia. Operation was generally satisfactory except that frequent rodding was required to remove lumps which formed around the distributor. The lump formation was similar to that described earlier when anhydrous ammonia was used. It probably could have been prevented as before by premixing the water with the ammonia. The degree of ammoniation was 7.1, and the ammonia loss was negligible. Granulation was fairly good; 58 per cent of the granular product was onsize. The moisture content of the material from the granulator was 9 per cent. The material was not processed farther than the granulator. Artificial drying probably would have been required to decrease the moisture content

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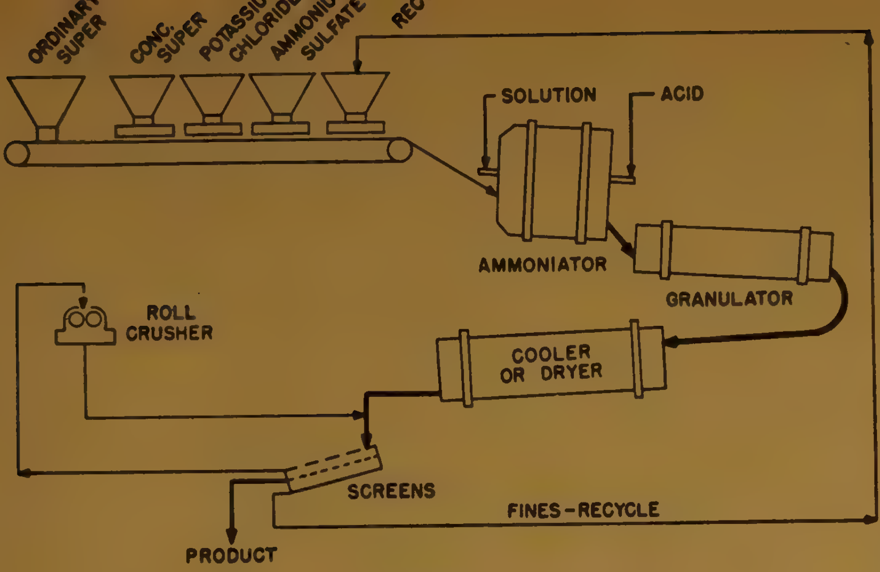

Figure 1
Flow diagram of TVA Pilot Plant for Granulation of High-Analysis Fertilizer

enough to prevent caking in storage.

One exploratory test (J-7) was made in which calcium metaphosphate was used to replace the concentrated superphosphate in making granular 5-20-20. The production rate was 1 ton per hour. During the test the sulfuric acid rate was varied to find the amount that gave best granulation. About 120 pounds per hour appeared to be about optimum. Thirty-six pounds of water per ton were added to assist in granulation. Air was blown onto the surface of the material in the ammoniator at a rate of 3700 cubic feet per ton to reduce the formation of oversize.

Granulation was good in this test; 70 per cent of the material from the granulator was onsize. After crushing the oversize, 87 per cent of the cooler product was onsize. The ammonia loss was about 2 per cent. The screened product contained only 0.6 per cent moisture even though it was not dried artificially.

Production of Various Fertilizer Grades

TYPICAL pilot-plant data for production of several grades of granular fertilizer are shown in Table II. This work is described in detail elsewhere (1). The degree of granulation and strength of the granules were considered satisfactory for each of the tests shown in Table II. With the exception of those grades that were made with phosphoric acid, artificial drying was not required. Bag-storage tests indicated that the physical properties of the products were satisfactory, particularly when cured 7 days and coated with 2.5 per cent by weight of kaolin.

The effect of particle size of the solid raw materials was studied briefly during tests with 8-16-16. When the raw materials, potassium chloride and superphosphate, were ground to pass a 28-mesh screen, granulation was poor with large amounts of both oversize and undersize. Using unground raw materials in which 39 per cent of the superphosphate and 11 per cent of the potassium chloride were plus 28 mesh improved granulation considerably. Substituting granular potassium chloride (73% +28 mesh) further improved granulation. In a few tests with grades other than 8-16-16 the particle size of the potassium chloride had little effect on granulation.

A few tests were made in which 0.5 or 1.0 pound of an anionic surfactant per ton of product was added to the mixture entering the ammoniator. Some increase in the percentage of onsize granules was noted in some of the tests, but the effect was all and not conclusive. ★★

References

1. Hein, L.B., Hicks, G. C., Silverberg, Julius, and Seatz, L. F. "Granulation of High-Analysis Fertilizers." October 28,1955. (Presented at the 128th National Meeting of the American Chemical Society, Minneapolis, Minnesota, September 1955
2. Yates, L. D., Nielsson, F. T., and Hicks, G. C. *Farm Chemicals* 117, No. 7, 38-48; No. 8, 34-41 (1954).

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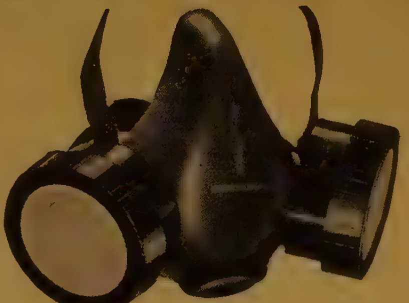

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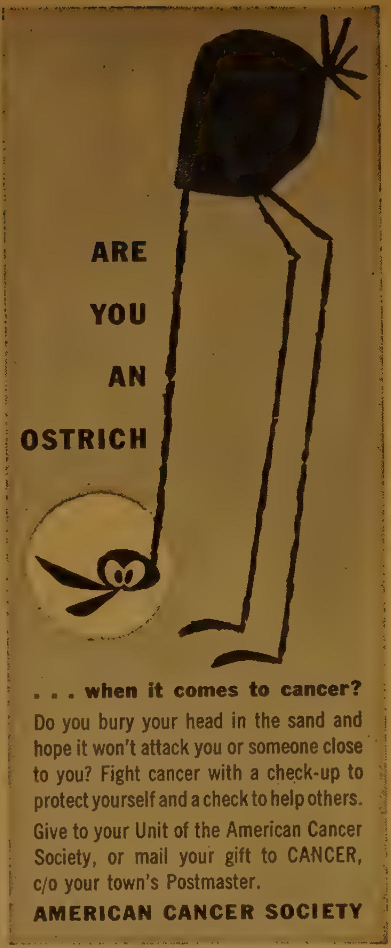

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Mar. 5-16 — Nematode Training Course, U S Department of Agriculture, Plant Pest Control Branch, nematode laboratory, Hicksville, L. I., N. Y.

March 6-7 — Western Production Conference, Fresno Hacienda, Fresno, Calif.

Mar. 6-8—Pest Control Operators' Conference, Frear Lab., Pennsylvania State Campus, University Park, Pa.

March 14-18 National Agricultural Chemicals Assn. Hollywood Beach Hotel, Hollywood, Fla.

March 28-30—North Central States Branch of ESA, Purdue Memorial Union, Lafayette, Ind.

April 11-12 — 7th Insect & Rodent Short Course for Sanitarians, Purdue University, Lafayette, Indiana.

April 16-17 — California Fertilizer Conference, annual meeting, Citrus Experiment Station, Univ. of California, Riverside, Calif.

May 7-9—Carolinas Virginia Pesticide Formulators Association, Inc., Ocean Forest Hotel, Myrtle Beach, S. C.

May 20-22 — Chemical Specialties Manufacturers Association, Hotel Drake, Chicago.

June 5-6 — North Central Division of the American Phytopathological Society, Kansas State College, Manhattan, Kans.

June 10-13 — National Plant Food Institute, The Greenbrier, White Sulphur Springs, West Virginia.

June 28-30—Association of Southern Feed & Fertilizer Control Officials, Hotel Roanoke, Roanoke, Va.

July 12 — Annual South Carolina Fertilizer meeting and tour of the Edisto, Experiment Station, Blackville, S. C.

August 1—Kentucky Fertilizer Conference, Guignol Theatre, Univ. of Kentucky, Lexington.

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AEROSOL AGE will go to the manufacturer, the packager, the distributor, the supplier, summarizing in *one* publication, *all* the information they want. Until now, aerosol manufacturers and distributors have had to search through a dozen trade publications for occasional reports on topics of interest. Sometimes they did . . . but often did not . . . find the information they were seeking.

The number of manufacturers, custom packagers, dealers and distributors of aerosols is difficult even to estimate at this early stage of the industry's development. A study of the market, supported by the opinions of industry leaders, points to a minimum readership for AEROSOL AGE of four to five thousand persons who are actively concerned with the manufacture, packaging and distribution of all types of aerosol products.

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Index to ADVERTISERS

Abrasion & Corrosion Engineering Co. ..... Feb.
African Pyrethrum Development, Inc. 77
Agricultural Chemicals, Inc. 114
Thos. Alabama Kaolin Co. 126
American Agricultural Chemical Co. ..... Feb.
American Chemical Paint Co. 125
American Cyanamid Co. 30
American Potash & Chemical Corp. 50
W. R. E. Andrews Sales, Inc. 123
Antara Chemical Div., General Aniline & Film Corp. 102
Armour and Co. ..... Feb.
Ashcraft-Wilkinson Co. 17, 110
Atlantic Refining Co. 76
Atlas Powder Co. 84
Atkins, Kroll & Co. 24

Bagpak Div., International Paper Co. ..... 3rd Cover
Bell Clay Co. ..... Feb.
Bemis Bro. Bag Co. 10, 11
Berkshire Chemicals, Inc. 127
Blaw Knox Co. ..... Feb.
Blue Valley Engr. & Equip. Mfg. Co. 62
Bradley & Baker ..... Jan.
Bradley Pulverizer Co. 70C
Burlap Council of Indian Jute Mills Assn. 124

California Spray Chem. Co. ..... Feb.
Chemagro Corp. 100
Clark Equipment Co. 95
Climax Molybdenum Co. ..... Feb.
Columbia Southern Chemical Corp. 29
Combustion Engineering, Inc., Raymond Division 16
Commercial Solvents Corp. 12
Continental Can Co., Shellmar Betner Div. ..... Feb.
Cox, Dr. Alvin J. 145

Davies Nitrate Co., Inc. 129
Davison Chemical Co., Div. of W. R. Grace & Co. ..... Feb.
Deere & Co., Grand River Chem. Div. ..... Feb.
Diamond Alkali Co. 94
Doane Agricultural Service Inc. ..... Jan.
Dorr-Oliver Co. ..... Feb.
Dow Chemical Co. 85
Duval Sulphur & Potash Co. 110

Eagle-Picher Co. ..... Nov.
Eastern Magnesia Talc Co., Inc. 142
Eastern States Chemical Corp. 122
Emulsol Corp. 60
Escambia Bay Chem. Corp. 17

Faesy & Besthoff, Inc. 146
Fairfield Chemical Div., Food Machinery & Chemical Co. 59
Finco, Inc. ..... Feb.
Flag Sulphur & Chemical Co. 105
Floridin Co. 83
Frontier Chemical Co. 108
Fry Co., Geo. H. 141
Fulton Bag & Cotton Mills 64

Geigy Chemical Co. 20
General American Transportation Corp. 120
General Aniline Film Corp. 102
General Reduction Co. 116
Gerotor May Corp. 132
Glendon Pyrophyllite Co. 112
Grand River Chemical Division of Deere & Co. ..... Feb.
Greeff & Co., R. W. 144

Hardinge Co. ..... Feb.
Heckathorn & Co. ..... Feb.
Hercules Powder Co. ..... 4th Cover
Huber, J. M. Corp. 109
Hudson Pulp & Paper Corp. 115

International Minerals & Chemical Corp. 15

Jefferson Lake Sulphur Co. 139
Johns-Manville Co. 117
Johnson, C. S. & Co. 130

Kennedy Minerals Co., Inc. 142
Kolker Chemical Co. ..... Feb.
Koppers Co. ..... Dec.
Kraft Bag Co. 13

Lancaster, Allwine & Rommel 128
Lebanon Chemical Corp. 144
Lion Oil Co. 14
Lummus Co. ..... Feb.
Luria Engineerin Co. 57
Ludlow-Saylor Wire Cloth Co. 103

McDermott Bros. Co. ..... Feb.
McLaughlin Gormley King Co. 146
Michigan Chemical Corp. 73
Mine Safety Appliances Co. 140
Minerals & Chemicals Corp. of America 4, 25
Mississippi River Chemical Co. ..... Jan.
Monsanto Chemical Co. ..... Feb.

National Potash Co. 68
National Agricultural Chemicals Assn. 128
National Aniline Div., Allied Chem. & Dye Corp. 70B
Naugatuck Chemical Division, U. S. Rubber Co. 134
Niagara Chemical Div., Food Machinery & Chem. Co. 18
Ninol Laboratories, Inc. ..... Jan.
Nitrogen Div., Allied Chem. & Dye Corp. 6, 7
Nitroform Division, Woonsocket Color & Chemical Co. 145
Nopco Chemical Co. 78

Oldbury Electro Chemical Co. 144
Olin Mathieson Chemical Corp. ..... 2nd Cover

Pacific Coast Borax Co. 72
Penick, S. B. & Co. ..... Jan.
Pennsylvania Industrial Chemical Corp. ..... Dec.
Penick, S. B. & Co. 79
Pennsylvania Salt Manufacturing Co. 74, 75
Phelps Dodge Refining Corp. 66
Phillips Chemical Co. 86
Potash Company of America 3
Powell, John & Co. ..... 2nd Cover
Prentiss Drug & Chemical Co. 19
Presto Manufacturing Co. 142
Private Brands, Inc. 136

Raymond Bag Co. ..... Feb.
Raymond Division, Combustion Engineering, Inc. 16
Refined Products Corp. 8
Republic Steel Corp. ..... Feb.
Renneburg & Sons Co., Edw. 137
Reideburg, Theodore Associates 145
Rohm & Haas Co. 71

Shell Chemical Co. 80, 81
Sohio Chemical Co. ..... between 18 & 19
Southeastern Clay Co. 111
Spencer Chemical Co. 21
Spraying Systems Co. 146
Squibb Taylor Inc. 118
Standard Agr. Chemicals, Inc. 87
St. Regis Paper Co. ..... Dec.
Stauffer Chemical Co. 22
Stedman Foundry & Machine Co. 131
Sturtevant Mill Corp. ..... Feb.
Summit Mining Corp. 135

Tar Residuals, Inc. 140
Tennessee Corp. 23
Texas Gulf Sulphur Co. ..... Feb.
Townsend, Dr. G. R. 145

Union Bag & Paper Corp. ..... Feb.
Union Special Machine Co. ..... Feb.
United Clay Mines 140
Union Standard Equipment Co. 144, 146
U. S. Industrial Chemicals Co. 28
U. S. Phosphoric Products, Div., Tennessee Corp. 82
U. S. Potash Co. 26

Vanderbilt Co., R. T. 107
Velsicol Chemical Corp. 96
Vulcan Containers, Inc. 121
Vulcan Steel Container Co. 70D

Williams Patent Crusher & Pulverizer Co. 27
Willson Products Inc. 143
Wisconsin Alumni Research Foundation 142
Woodward & Dickerson, Inc. 138
Woonsocket Color & Chemical Co., Nitroform Div. 145

Young Machinery Co. 133

Zonolite Co. ..... Feb.

Tale Ends

THIS is the time of the year when being in the ag chem field really pays off. What with a convention in Hollywood, a plant dedication on the gulf coast, a pest control conference in Alabama, it might be possible to keep the winter vacation tan alive until July. But how do you get any work done?

AC

An increase in freight rates, scheduled to go into effect February 25, is calculated to increase fertilizer costs to the farmer this season. With the peak fertilizer season just ahead, and many users as usual having delayed their buying programs to the last minute, this rail rate advance is going to cause an unexpected advance in the '56 fertilizer bill.

AC

Prof. J. J. Davis of Purdue University, Lafayette, Ind., who has occupied an important role in the field of pest control for the past twenty years is scheduled to retire at the end of the current academic year. He it was who started the annual Purdue Pest Control Operators Conference which this year was attended by over 350 pco's from all over the country. Honoring Prof. Davis in advance of his retirement, they presented him with a citation, a book of letters and a TV set.

AC

American producers of DDT may well be pardoned if they view with a somewhat jaundiced eye the photos of the opening of a new plant in New Delhi, India, where India will in the future make much of her own DDT. Built largely with UN funds, which are of course contributed primarily by U. S. tax payers, the new DDT plant will further cut down America's export market for this basic insecticidal raw material. The Indian plant is designed to produce 700 tons a year of DDT, and plans are already under way to double capacity. Maybe they will eventually even ship some here.

AC

Experimental work in Louisiana during the 1955 season showed 100% ryania to be an extremely effective and relatively economical insecticide for use in protecting sugarcane against the attack of the sugarcane borer, — as well as a possible detour around the Merck patent. Increases in sugar production averaged 700 lbs. per acre where 100% ryania was applied, which was substantially better than results obtained with the 40% ryania normally employed. See our April issue for a full report.

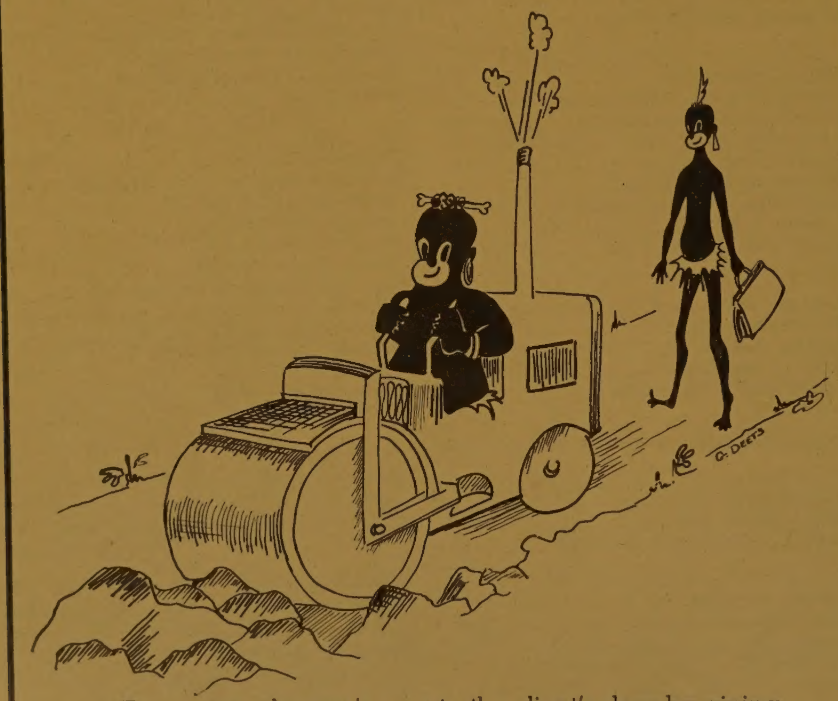
AC

1956 marks the 50th anniversary of the first Federal Food and Drugs Act of 1906. George Larrick, commissioner of FDA, has declared a year-long celebration of the anniversary. Purpose will be to further public understanding of the food and drug laws; to inform the public of the law's benefits; through education to strengthen effectiveness of food and drug legislation; and finally to give publicity to the industries that have made American foods, drugs, chemicals and cosmetics the best in the world.

AC

We suggest that Dr. Larrick send a first educational telegram to Leonard Wickenden whose new book, "Our Daily Poison," proclaims we are all being poisoned in our beds. With a carbon copy to Dr. Morton S. Biskind.

Smooth The Path!



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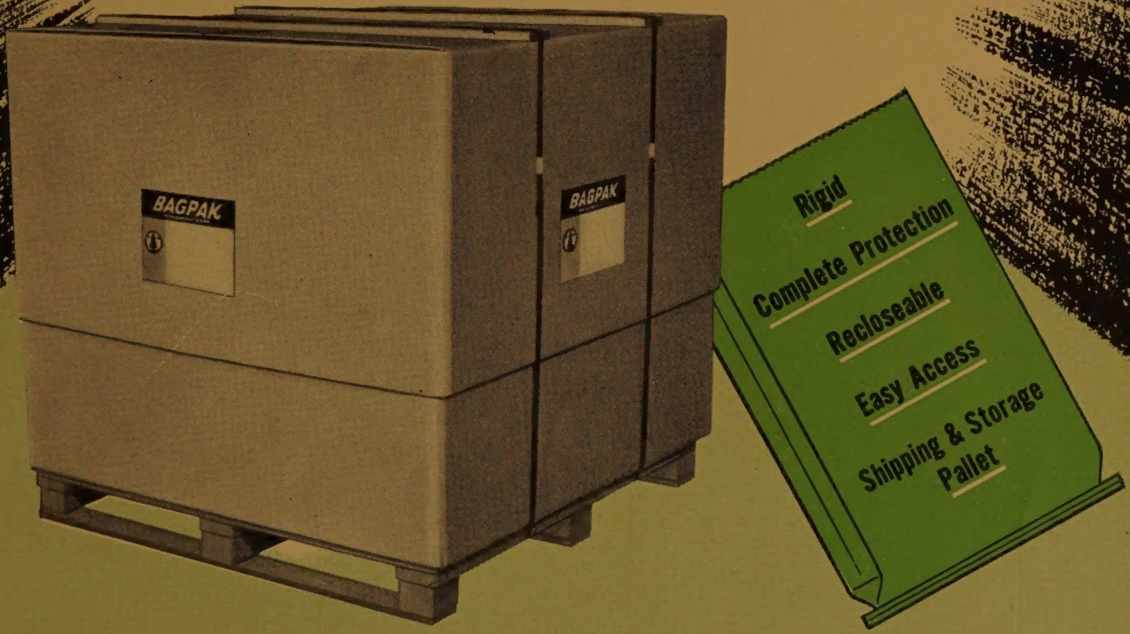

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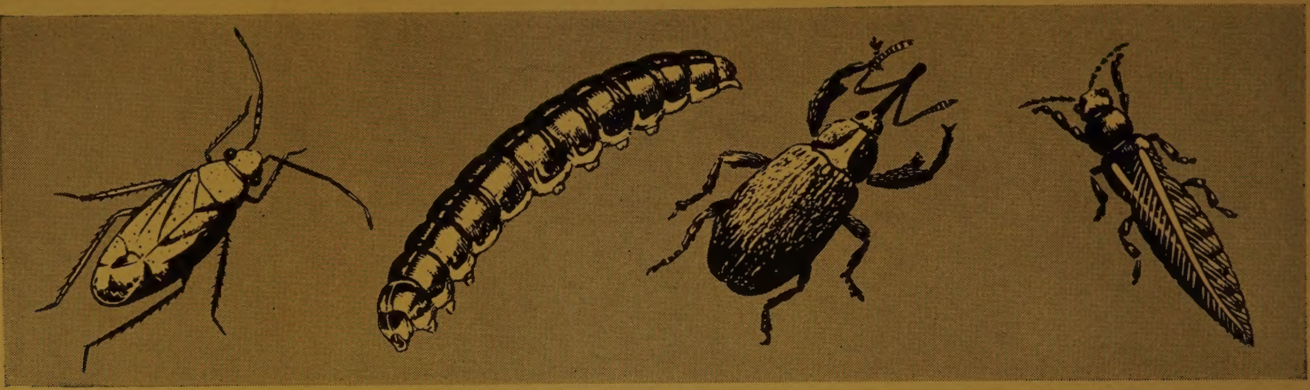

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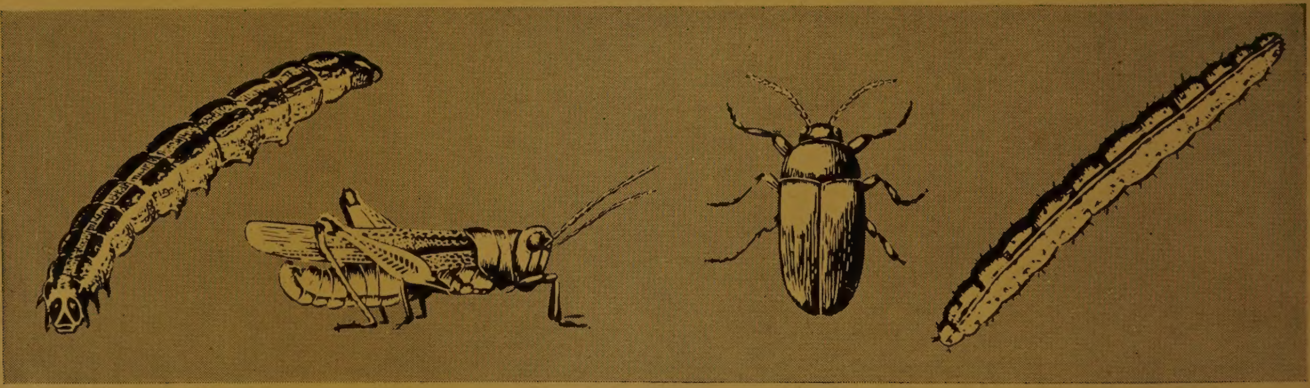

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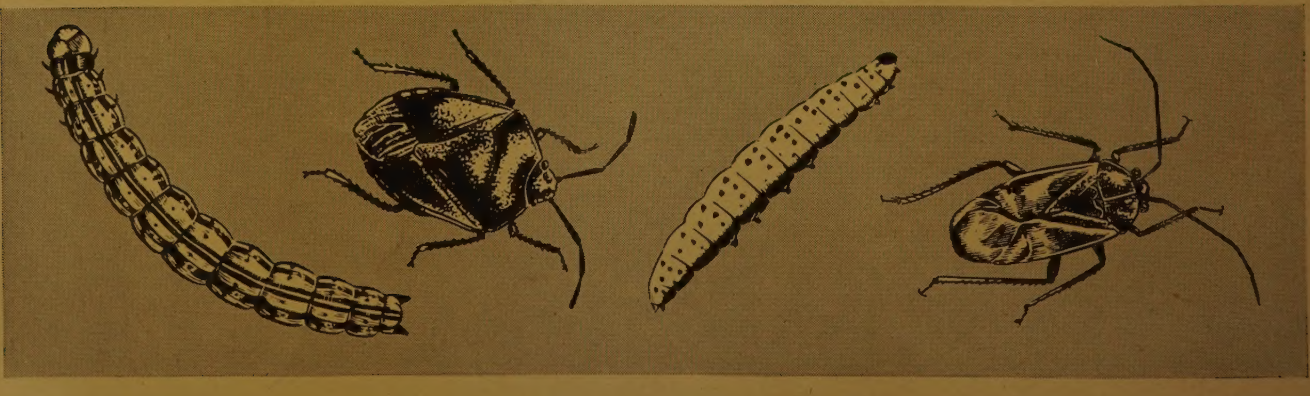

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